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ABSTRACT

This document reports the highlights of an international conference designed to study the utilization of highly qualified personnel. Following the opening addresses by various participants, discussion documents and basic reports are presented. Four areas of concern include the state of employment and employment policy, the conditions and aims of education and training, concerted action, and psychological and social factors. Discussion documents cover employment prospects in the 1970's, career development and mobility, and further education and training of highly qualified personnel. The basic reports include employment prospects in the seventies, further education and training of highly qualified personnel, the allocation of labor and the consequences for educational policy, and international movements of scientists and engineers in the 1960's as an aspect of the mobility of highly qualified manpower. The appendices include the agenda, a list of documents submitted to the conference, and a list of participants to the conference. (MJM)

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THE UTILISATION OF HIGHLY QUALIFIED PERSONNEL

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VENICE CONFERENCE 25th-27th OCTOBER 1971

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PREFACE

The second Intergovernmental Conference on the Utilisation of Highly Qualified Personnel was held in Venice, under the auspices of the Italian Ministry of Public Instruction, from 25th to 27th October, 1971.

It was attended by high-level Member government representatives responsible for employment and education and by representatives of industry, employers' organisations, professional associations and trade unions.

The Chairman of the Conference was Mr. Pier Luigi Romita, Under-Secretary of State for Public Instruction (Italy); the sessions were presided over by Mr. Malcolm R. Lovell, Jr., Assistant Secretary for Manpower (United States); Dr. G.N. Perry, Assistant Deputy Minister, Ministry of Manpower and Immigration (Canada); and Recteur Jean Capelle, Rapporteur de la Commission des Affaires culturelles, familiales et sociales de l'Assemblée nationale (France). .

The first Conference on the Utilisation and Training of Scientific and Technical Personnel took place in Paris in September, 1966. At that time, governments were mainly concerned with the growing need for qualified personnel in an expanding economy, and the definition of an education policy to meet this need through the adaptation and transformation of educational structures and objectives. They were also seeking to make the most of available qualifications through better deployment, improved opportunities for adaptation to technological change and professional development.

The second Conference reached beyond these mainly economic concerns. The preparation of the Venice Conference brought to light, in the most advanced countries, new trends in qualification supply and demand linked with economic development and the spread of technical progress, but also with educational growth and current changes in the objectives of society. It seems doubtful that these trends will be reversed.

These trends reveal a certain divergence between the present orientation of the educational system, the economy's needs and actual employment opportunities; they raise a whole set of new problems and lead to a re-examination of the education and employment policies practised over the years by governments, firms, employers' organisations and trade unions and point sharply to the need for new concepts to bring about greater integration between these policies if the aspirations and career patterns of individuals are to be reconciled with the changing needs of society and the economy.

The aim of the second Conference was thus to bring about an awareness of the nature and magnitude of current changes, the responsibilities of the various interested parties in the definition and implementation of policies and the need to take an overall view of the problems. The Conference also made it possible to define the fields in which research, with a new approach, will be most necessary and likely to yield practical results.

Acknowledgements

The OECD wishes to thank the Italian Government and the Giorgio Cini Foundation for receiving the Conference on the beautiful Island of San Giorgio Maggiore, Venice, and for their extremely efficient assistance in the organisation and holding of the Conference.

TABLE OF CONTENTS

Preface.....	5
Summary of discussions by <u>Roger Grégoire, Conseiller d'Etat (France)</u>	11

Book I - Proceedings of the Conference

Part One

Opening Addresses

I. Address by <u>Gérard Eldin,</u> <u>Deputy Secretary-General of the OECD</u>	31
II. Address by <u>Pier Luigi Romita,</u> <u>Under-Secretary of State for Public Instruction</u> <u>(Italy)</u>	37
III. Address by <u>Malcolm R. Loveil, Jr.,</u> <u>Assistant Secretary for Manpower, Department of</u> <u>Labor (United States)</u>	45
IV. Address by <u>Folke Haldén</u> <u>Swedish Employers' Confederation, representing the</u> <u>Business and Industry Advisory Committee to the</u> <u>OECD</u>	49
V. Address by <u>Robert Cottave,</u> <u>Secrétaire Général, Fédération nationale des ingénieurs</u> <u>et cadres supérieurs (Force Ouvrière) (France)</u> <u>Representing the Trade Union Advisory Committee to</u> <u>the OECD</u>	55
VI. Address by <u>Seymour L. Wolfbein,</u> <u>School of Business Administration, Temple University,</u> <u>Philadelphia (United States)</u>	59

Part Two
Major Policy Problems

I.	Overview by <u>Léon Ter-Davtian, Directorate for Scientific Affairs, OECD</u>	69
II.	Discussion documents.....	93
	A. Employment Prospects in the 1970s.....	93
	B. Career Development and Mobility.....	98
	C. Further Education and Training of Highly Qualified Personnel.....	105
III.	Conclusions of the Conference.....	115

Book II - Basic Reports

I.	Employment Prospects in the Seventies by <u>Eric Esnault, Directorate for Scientific Affairs</u> ..	125
II.	Further Education and Training of Highly Qualified Personnel by <u>Jean le Pas, Directorate for Scientific Affairs</u> ...	211
III.	The Allocation of Labour and the Consequences for Educational Policy by <u>Olav Magnussen, Directorate for Scientific Affairs</u>	281
IV.	International Movements of Scientists and Engineers in the 1960s as an Aspect of the Mobility of Highly Qualified Manpower by <u>the Secretariat</u>	311

ANNEXES

I.	Agenda.....	403
II.	List of documents submitted to the Conference.....	409
III.	List of Participants to the Conference.....	413

SUMMARY OF DISCUSSIONS

by

Roger Grégoire, Conseiller d'Etat (France)

It is indeed a difficult task, at the end of a Conference such as the present, to sum up so many contributions, so full of valuable material, and to draw conclusions from them. It would be presumptuous to try to do more than give a few impressions of the trend of events and ideas between the Paris meeting in 1966 and the one which has just ended. These impressions are based on the very comprehensive documentation presented by Member countries, the speeches of the different Delegations and talks in the cloisters and gardens of the Giorgio Cini Foundation. Like all impressions, they no doubt include a certain subjective element.

The changes which have taken place over the past five years in the manner of formulating and answering questions affecting highly qualified personnel can, with a little artifice, be grouped under four heads, according to their main centre of interest, namely:

- the state of employment and employment policy
- the conditions and aims of education and training
- concerted action
- psychological and social factors.

I. THE STATE OF EMPLOYMENT AND EMPLOYMENT POLICY

1) From the Paris Conference to the Venice Conference

The feeling in 1966 was that we were still in a period of shortage, and in some countries forecasters were being asked to produce data whereby training facilities could be adapted - mainly from the point of view of quantity - to meet the needs for personnel. The position on these two points is very different today.

a) First of all, in those countries where technological progress would seem to imply an increasing demand for highly qualified personnel, the experience of the past few years indicates, on the contrary, a state of surplus. In the United States, Great Britain¹⁾ and Sweden, unemployment among university graduates, particularly in the "advanced" scientific and technical sector, is so marked that sometimes radical measures are contemplated. Thus, noting the fact that 65,000 engineers and research scientists, mostly very highly qualified (doctors) were out of work in the United States, some American universities have decided to discontinue all preparation for doctoral theses this year. In countries such as France, where training efforts started later, the situation is less disturbing but difficulties are already being encountered in placing certain categories of young graduates and particularly in placing more experienced executives who lose their jobs.

This situation seems even more complex when the two following facts are taken into account.

- Whereas people with a record of serious study or long practical experience are looking in vain for work, employers continue to complain of the lack of competent staff. This indicates that nowadays there is no common measure between the qualifications held by the one group and the activities defined by the others, or at least that training is regarded as so specific that there is only one type of job for each type of training.

The disequilibrium recorded in the labour market for highly qualified personnel is therefore essentially qualitative. But one may reasonably ask whether this is not sometimes accentuated by

1) The number of 1971 graduates still looking for a job in Great Britain is estimated at 5,000 or 10 per cent of the total.

tradition; no doubt in many cases the education system provides training which is not sufficiently adapted to the jobs to be done. No doubt there is still too often a tendency towards grossly exaggerated specialisation which makes it difficult to recycle, or even to perfect and update knowledge. But do not the recruitment services on their side attach too much value either to diplomas or to previous activities when they refuse to recognise the possibility that candidates for a post with new technical characteristics may be able to acquire the supplementary knowledge needed to hold it?

Qualitative disequilibrium has another aspect; the faulty guidance of students and sometimes the restrictive attitude of teachers and professional bodies, leading in some sectors to the production of graduates with no prospects and in other sectors to shortage. Thus, in spite of the considerable expansion of post-secondary education in the United States, that country is suffering from a shortage of medical practitioners.

- In the most highly developed countries nearly half the jobs which, on a rational analysis, would seem to call for sound theoretical as well as practical knowledge, are held by people who have been trained "on the job". Some people justify this state of affairs by vaunting the educational virtues of work - and there is a great deal of truth in this attitude. It does not, however, do away with the fact that the evolution of scientific discoveries and their technological applications in all fields - including the administration of things, and relations between men - now call for systematic training. Can it honestly be said that the internal promotion of executives who have had no post-secondary education is always accompanied by supplementary training provided by the employer, or at least followed by a probationary period of adaptation? No doubt this happens in a few big firms, but there is nothing to indicate that the practice is general in most countries.

b) Secondly, the leading specialists in employment forecasting acknowledge that no valid conclusions can be drawn from the work done during the past few decades to try to match resources with the needs for skills. The reasons for this relative setback have been made clear in some of the Conference papers, especially that presented by the Munich Institut für Sozialwissenschaftliche Forschung. First of all, the statistics are inadequate. Secondly, there are too many unknown factors, such as the conditions of access to different jobs and the extent

to which general knowledge contributes to professional success or failure. Finally, this work has been macro-economic in character. It has tended to disregard the individual, his aspirations and his desire to achieve the highest possible social status. Now, it is the individual and the course of his professional career which should take first place in the minds of all those who are concerned with the complex relations between training and employment.

2) Towards an employment policy for highly qualified personnel

The members of the Venice Conference disregarded none of these new factors which have just been outlined. But they did not envisage extreme solutions; this means that Member countries are reacting calmly to a situation which nevertheless disturbs them, and that in the eyes of the responsible authorities in those countries the training mechanism should be geared to the labour market by a series of specific individual measures rather than by authoritarian planning. A certain number of guidelines nevertheless emerge from the working papers and the proceedings, namely a better appreciation of the needs, more effective personnel management, and the encouragement of mobility.

a) In the light of the partial failure of the first attempts, the specialists think today:

- that attempts at quantitative forecasting should be completed by qualitative analyses, both more delicate and less far-reaching; these analyses themselves should take account of the work done in psychology and sociology;
- that the dialectic qualifications-job must be replaced by the dialectic qualifications-duties.

This new approach has two advantages: first, the dialectic qualifications-job will no doubt lead to the emergence of "common cores" of qualifications corresponding to skills and attitudes required for activities performed in apparently very different jobs. Secondly, it partly eliminates the conflict between the recognised skills of workers and the tasks assigned to them, a conflict which to some extent explains, as indicated above, the co-existence of surpluses and deficits on the market for highly qualified manpower.

b) The statements made on personnel management have been dominated by the findings usually made by the employers' organisations themselves. These findings point to three main weaknesses.

The first is a paradoxical conception of recruitment. Whereas employers as a whole admit that their most valuable staff are those who are most adaptable, a number of them still select their young highly qualified staff on the basis of extremely specialised criteria. This practice is the source of the difficulties experienced. It has the further disadvantage of giving students a false idea of the real needs of the economy and of their own best interests.

The second weakness is a very general absence of a sound career structure. Such structure, however, is at the same time for the firm, whatever its nature, an essential forecast tool of management and for the employees an element of assurance, as much as, if not more than of emulation.

Traditionally, the labour market has been that of people who were looking for jobs, and employment policy consisted of trying to help these people to adapt themselves to the requirements of employers. But in the absence of sound personnel management, these requirements are ill-defined and ill-known. It is difficult to specify the role of the "external market" - unless it is to be restricted, as it used to be, to unskilled labour, whose numbers are steadily shrinking - unless the "internal market of firms", on which employers generally draw first, is known. Personnel policy is therefore one of the essential elements in the sound operation of an employment policy at national level.

We are in fact touching upon a new aspect of working relations. Up to now they have been limited in practice to questions of pay and hours of work. Working conditions in the widest sense now form part of the field of negotiation between management and labour organisations; personnel management, career structures, preparation for post-retirement activities, further training or adaptation of skills by continuing education - in short the whole pattern of working life, in which training activities will play an increasing part - constitute a new chapter in labour law which cannot fail to grow in importance with the present trend of facts and ideas.

This last weakness may perhaps explain the other two. It is nothing less than the lack, in the great majority of cases, of the necessary facilities for conducting a personnel policy.

Material facilities in the first place; most firms, even the biggest, know much less about the men they employ than about the machines they use. Human facilities next: the real problems of personnel cannot be delegated to subordinates: they must be handled at top level. Not only must "man management" specialists be trained but top executives must be made to realise that the broad lines of this management can be defined and, if necessary, negotiated, only by themselves.

c) Some speakers have vaunted the merits of mobility. But not all mobility is a good thing in itself. The Conference papers have furnished some interesting particulars on this point based on systematic studies.

"Sound" mobility can be organised inside a firm if it enables the personnel both to meet new challenges and to improve their professional skills; the Japanese example is extremely instructive in this respect. But if it became general it might have undesirable consequences: the creation, as in Japan, of two categories of workers, those who have adapted themselves from the start of their working life, and those who, for one reason or another, find themselves outside the system and whose reintegration is not very probable. This formula induces executives and their professional organisations to look for stability in employment with a single employer, and thus fail to realise that change of employers - the private sector, the public sector, and so forth - may also constitute "sound" mobility. In practice it allows the diffusion of the skills and experience possessed by individuals, while at the same time affording those individuals enriching stages in their careers.

It should, moreover, be emphasized that the encouragement of mobility, even "sound" mobility, means changing the whole social context; housing policy, the removal of barriers between compulsory insurance schemes, educational facilities available for children and the integration of wives in new social and occupational surroundings are all just as important as direct action on the labour market.

II. THE CONCLUSIONS AND AIMS OF EDUCATION AND TRAINING

1) The changes observed

Training conditions, for their part, have changed in two ways:

- social pressure for the development of initial training has become accentuated;
- the traditional concepts of higher education have been challenged.

a) Until recently the main purpose of what is called higher education - apart from the increase in knowledge by means of research - was to prepare the future leaders of society for their task. But, at the same time, or as a result of the transformation of this society - which is expressed, in particular, by a wider access to knowledge - this objective is challenged and social pressure for the development of post-secondary education becomes accentuated.

The countries in which access to all or some of the higher education establishments is open as a right to all secondary certificate holders - France is an example - have experienced an enormous increase in student enrolments in the past few years. Countries such as the United States, where this access is, in one way or another, subject to limitation of number, are beginning to ask themselves whether, by the end of the century, the universal education system will not necessarily include some years of university study.

This evolution could only be welcomed, were it not too often based on a tragic misunderstanding. Young people look to post-secondary education to guarantee them a place on the labour market, whereas this guarantee, if it ever existed, has disappeared. For them, getting a degree - whether at the cost of wearisome and even sterile-making studies - is more important than the enrichment of their personality. They behave just as though higher education conferred a "status" which gave them rights over society.

Social structures, moreover, can only heighten this illusion. In many countries there is a direct link between the type of education received and access to certain jobs, owing to the network of relationships established, especially at the top levels of the professional hierarchy, between the education system and the types of jobs. Furthermore the possession of precisely specified degrees often governs entry into certain professions which are subject to regulations, the level of recruitment into the public service, or even the classification of remuneration fixed under collective wage agreements. The breach which is beginning to manifest itself between the academic value and the

social - and market - value of degrees constitutes, in the present state of opinion, a by no means negligible political and social danger.

b) Is the challenge to the traditional concepts of higher education calculated to lessen this danger? It may arouse as much fear as hope. This challenge is the fruit of "student revolts", themselves originating in the anxieties of young people about their future and more especially in their mistrust of education which they deem inadequate to their aspirations. It has assumed two main aspects in addition to sporadic changes in teaching methods and student participation in university administration.

The first is what is known in some countries as the search for "new streams". The idea is to prepare students for activities different from those to which they traditionally go, namely teaching, the professions, the civil service and highly technical jobs in the private sector. In the United States this orientation has already been well established for some time. In Europe it is still only quite recent. In many countries it still arouses conflicts bordering on the philosophical conflicts: the partisans of culture as conceived for the past two centuries are opposed to those who believe that we can and should define a culture of the modern man in which technologies will find their place.

In any event, this effort on the part of educational institutions to meet the expectations of the young is still too recent to have the support of employers. In the course of the Conference the employers' representatives expressed some doubts whether the University, in the wide sense, can meet the needs of the economy. It is not so much in the field of knowledge that they challenge its contribution as in that of aptitudes and attitudes: "Life on the campus" said one of them "is only remotely related to real life." And went on to recommend training systems in which teachers and employers would co-operate. This attitude is very positive, provided that it does not lead to an outdated division of competence, one party being reduced to dispensing "education" while the other monopolises "training".

The second aspect assumed by the challenge to traditional higher education is the search for what might be a genuine continuing education. There is no common measure between the first attempts to re-cycle the unemployed, the first efforts at "social betterment" and the ideas which are now beginning to take shape. It is no longer a question of helping some people to

"catch up", but of working out a system in which initial training will merely be a first phase in an education which may be resumed again at any moment, at the discretion of those concerned, for their own reasons - the desire for professional improvement being in no way exclusive - and at a time of their choosing.

Too much has been said over the past ten years on the subject of continuing education for us to feel any surprise at its poor development, at any rate in the European countries. The fact is that it is a revolution for which people's minds are not yet prepared, although some countries are beginning to mobilise their resources. The French delegates have described the contractual, and subsequently legislative, measures taken in France to start turning this concept into reality: the recognition of the right to leave of absence for the purpose of studying, continued payment of workers who go back to study and the introduction of a training grant. And yet even in France a tendency can be noted to prolong initial training, which is in complete contradiction with the whole idea of continuing education.

This point constitutes the second difference between the Paris and Venice Conferences. In 1966, countries were recommended to create and develop the possibilities afforded to everyone in the course of his working life to perfect and educate himself. Now that these possibilities are developing, at least in some countries, it is found that they are far from reaching all those for whom they were intended. Such measures can, in fact, produce their full effect only if employers take continuing training into account in their personnel policy and regard it as one of the normal elements of executive activity. Thus we meet once again the need for all public and private undertakings to improve their present man-management practices.

2) The prospective approach and empiricism

It is not surprising that the Conference has devoted the greater part of its discussions in plenary session to questions of education, since they are becoming more and more bound up with questions of employment. There was fairly general agreement on the aims of post-secondary education, the reform of its internal organisation and the orientation of its students.

a) In one form or another, the following aims were suggested by a number of speakers.

Post-secondary education, which is everywhere becoming mass education, should serve both society and individuals by making it possible for all talents to come to fruition. It can no longer be a selective education designed to throw up an élite, whose dropouts will be wasted. It must be an education which leads those who receive it as far as they can and want to go.

It would be dangerous to endow it with any other immediate aim than that of developing a general culture on the basis of which utilitarian training could later be undertaken. In fact, except for an infinitesimal minority, students are preparing to earn their living and not all of them have either the desire or the means to prolong their studies. These studies must constantly "pay off" without thereby losing their cultural character.

This does not mean that they must in every instance include specific vocational training; their object is to prepare young people for their future and, in particular to develop the intellectual skills which will enable them to learn how to "earn a living" by rapidly acquiring the necessary specialised knowledge. Neither does this mean that post-secondary education, even if it leads up to a certificate, can confer rights or bestow a social status: it offers opportunity, not automatic entry into a "system".

Designed to enable all talents to come to fruition, post-secondary education cannot be confined to young people with no experience of working life. Neither can it be confined to a few disciplines and to training for top jobs. It must be diversified both in its nature and in the level of training it affords. It must nevertheless be orderly and in a uniform system, so as to allow, in particular, for changes in orientation, interruptions or even dropouts followed by a new start.

b) Those who are tempted by ideal constructions are ready to affirm that education of this kind can take shape only at the cost of a complete break with the present system. Some go so far as to imagine systems which are so flexible, training which is so individualised, that the whole conception of syllabus and certificate would disappear and the teaching function would change its nature; by the use of programmed courses, both the young and the not-so-young, checking their own progress by means of teaching machines and helped by guides rather than by "masters", would gradually find their own way, alternating work and study at their pleasure.

Do these views, paradoxical today, err by lack of realism? Are the more immediately applicable measures advocated by the empiricists not paving the way for a future of this kind? Those measures which have been described and which are already in force in many countries, are of three kinds.

The first set of measures are designed to fit every student for integration into working life. They range from the creation - at the side of long higher education leading to the traditional degrees - of short job-oriented cycles (such as the University Institutes of Technology in France) to a drastic reorganisation of university studies, in which each level prepares at the same time for entry into working life or for the possible pursuit of more advanced studies. The second set of measures are designed to open higher education outwards to the world. The sandwich courses developed in England and the first experiments in training teachers in industry in France are examples. The last set of measures are those which extend higher education facilities to adults. Some working papers make considerable reference to them. There is no point in reverting to them, except to stress the ferment created by this innovation which obliges us to re-appraise the whole education system.

c) Nor is there any point in dwelling further on the need to develop, as part of the education system, facilities for guidance which will, in particular, inform candidates about jobs which call for high qualifications and about their own real abilities and possibilities of further training and the career prospects open to them.

III. CONCERTED ACTION

Manifestly, employment policy and training policy cannot be conducted in isolation from each other. But more than that, these co-ordinated policies call for the active participation of a number of different kinds of partners. These comments, already made at the Paris Conference, would have been worth repeating with greater emphasis, in connection both with the formulation of action programmes and with the sharing of costs.

1) Formulating action programmes

The action to be taken must be defined in concert at different levels.

a) At national level, the national groups created in several countries are the result of this initiative: their action has proved far from negligible. But it may be regretted that, with one or two exceptions, these groups have remained unofficial in character, on the fringes of the government machine. The example of the French co-ordinating bodies, referred to in the course of discussion, remains unique.

b) At the level of the interested parties themselves, management and labour. It is very important to note that in many cases which point the way to the future it is on questions of continuing training that the most progressive collective agreements have been signed. Here again, it is enough to refer to the views exchanged in the course of the Conference in which the recognition of the right to training as an element of the labour contract, and the contractual mechanisms for the development of the educational mechanism were discussed at length. It should further be noted that the powers of persuasion which the authorities possess over management and labour were not unconnected with this contractual policy. In the last analysis, therefore, this policy must be quadripartite and bring to the same table the State, "both sides of industry", and those providing training, both public and private.

2) Finance

It is through the medium of such concerted action that the necessary resources, and particularly the financial resources, can be found.

The principle can be discussed of how to share the cost of training which, through individuals, benefits business firms and, through business firms, benefits society as a whole. From an empirical point of view, in any event, there are two things which must be said; and which were already said at the Paris Conference; the first is that, whatever proportion of the budget is allocated to education, it will never be enough to satisfy social pressure; new action will almost inevitably be sacrificed to the expansion of traditional activities. The second is that only exceptionally can training costs be borne by those who profit from them; if a worker is concerned, on the contrary, he must be helped to resume or pursue his studies.

We are therefore led to envisage systems of taxes or contributions specially earmarked for the new forms of education and

especially for everything connected with continuing training. If this training is directly or indirectly vocational, it is natural that the tax load should be borne by firms, provided they are able to free themselves of it by organising their own activities for the benefit of their employees. If the training can lead to the upgrading of those who benefit from it, it is natural that they should share the cost, as far as their means permit. This is the idea of "training insurance funds" financed by joint contributions, which have been launched in some countries.

IV. THE PSYCHOLOGICAL AND SOCIOLOGICAL FACTORS

The last major contribution of the past few years, spoken about on the fringes of the Conference as much as, if not more than in the course of the discussions, is a better knowledge of the "community" of highly qualified personnel. The psychological and social evolution of this community is complex; the transformation of conditions of employment and training are likely seriously to upset its balance.

1) The recent trend

a) Highly qualified personnel are progressively ceasing to be looked upon as intermediaries between management and other workers, closer to the former than the latter. Their proportion in the work force has considerably increased; thus, in France it rose from 12 per cent to 25 per cent between 1921 and 1968. This state of affairs is due both to the general rise in the standard of education and to the manifold needs of the economy and of society in which the processes of production and exchange require special qualifications and a high level of technical skill.

The increase in numbers, which leads to a certain "proletarianisation" of this type of personnel, explains the initiatives taken to defend their trade union interests. But these initiatives are not the sole origin of the "protest" in which they are engaged in a number of countries. Their level of training often puts them in a better position to denounce the injustices and shortcomings of working life and even of the social system as a whole. For the managers to disregard this aspect would be for them to bury their heads in the sand.

Furthermore, the technical conditions of their activity mean that this personnel can no longer be distinguished from their

immediate colleagues. Their effectiveness, like their individual and collective equilibrium, depends upon their training and "utilisation" not being divorced from that of the technicians who assist them. A number of speakers have stressed this point. Those who have implicitly expressed reservations - are they not referring to contingent situations which explain the present conditions of the training of "non-university executives" in certain countries?

b) But in spite of this increasingly close integration in the working world, highly qualified personnel still retain their specific characteristics. The main one is that, whatever their branch, they possess a de facto social status to which they are profoundly attached.

Whether this status originates from the diploma which marks the completion of their initial training or from the recognition by their firm of their hierarchical position, it influences their behaviour. Thus, as one of the trade union representatives has said, they feel that to lose their job, which other workers regard as a normal hazard of life, is a disgrace, which in many cases generates serious psychic traumatisms. To give them some protection against the risks of unemployment, to offer them possibilities of placement or resettlement is not enough to "put them back in the saddle".

It should be added that the feeling of holding a sort of social contract - engrossed on parchment or born of internal promotion - of having the right to a job, means that the great majority of those concerned are reluctant to undergo any refresher training. If they support the idea of continuing education, it is for other people. As apparently privileged members of a "frozen society" do they not contribute, at least unconsciously, towards crystallising its structures?

2) The challenge to established values

Now, there is no doubt that, quite apart from considerations of a political kind - which are outside the scope of the present report - some of the changes now going on in employment and training are tending to shatter these structures. They are, first and foremost, in danger of upsetting the equilibrium of the social and professional community in question.

Two examples, among others, are worth noting.

First, all employment specialists seem wedded to the new idea of the forecasters that needs for qualifications should be measured by the duties to be discharged and not by the jobs to be filled. But we must not delude ourselves. This new approach which, at first sight, has purely technical implications, may be the starting point for a thorough upsetting of traditions. In practice, while it is easy enough to match the qualifications needed for a job with a specific training defined by its level and curriculum, the link between the skills and attitudes needed to discharge certain duties and the traditional education streams is uncertain. Furthermore, if we reason in terms of duties, the hierarchical element attached to the idea of a job becomes blurred. It was one of the employers' representatives at the Conference who said that "it is nonsense to classify duties as senior or junior".

Secondly, the seriousness of social cleavages would be greatly diminished if the education system were more flexible and more varied, so that degrees no longer had a uniform value and getting a degree was no longer regarded as the main objective.

In the last analysis, it is the scale of values which is in danger of being revolutionised, first, by the disappearance of privileged social status linked to certain types of education, and then by the levelling of the hierarchy on which all our institutions, public as well as private, are based. Some people regard these prospects as a threat to a civilisation which seems to them to be irreplaceable, others as the dawn of a new society. This is not the place to comment on these reactions. But we are bound to recognise that these prospects, however remote, follow on in a straight line from our deliberations in Venice.

BOOK I

PROCEEDINGS OF THE CONFERENCE

Part One

OPENING ADDRESSES

I

Address by Gérard Eldin,
Deputy Secretary-General of the OECD

It is my very pleasant duty to represent the Secretary-General of the Organisation, Mr. van Lennep, here on the opening day of this second Intergovernmental Conference on the Utilisation of Highly Qualified Personnel which has brought you together for a few days in the splendid setting of the San Giorgio Maggiore island.

I should like to begin by saying how grateful we are to the Italian Government for having offered its hospitality to the Conference, and also to thank you, Mr. Minister, for having agreed to take the Chair in spite of the heavy burden of your official responsibilities. I should also like to thank all the distinguished personalities representing their Governments here today, and the experts and all those who have helped to organise the Conference.

There are a number of reasons which, in my view, make this Conference an important one. First, it has a direct bearing on the problems with which OECD is currently preoccupied. Secondly, it is being held at a particularly appropriate time, when the lack of balance between the demand for and supply of highly qualified personnel is taking on a different and entirely new aspect. And finally, the problem which this Conference is about to discuss is one which calls for a fundamental reassessment of the situation and a renewed effort of imagination by all responsible people - and first and foremost by governments themselves.

It is clear that the work being done at this Conference is directly relevant to the broad lines of action OECD has mapped out for itself in the 1970s. This is true both as regards the methods it is using and the content of the problems it is discussing.

1) As regards the methods, OECD aspires to be an up-to-date organisation which does not consider the various aspects of economic and social policy as though they belonged in completely separate compartments. On the contrary, our ambition is to use the "horizontal approach" to bring the various objectives of economic policy in direct confrontation with each other. This is the only way of getting rid of the contradictions thus revealed and arriving at constructive compromise solutions. This is the method we used, for example, in analysing the problem of inflation.

The subject of your Conference is an excellent example of this, since it is situated at the crossroads where problems of education, employment policy and economics all meet. That is why we can see here today specialists in education and manpower rubbing shoulders with statisticians and economists, and with employers' and trade union representatives. I am convinced that this confrontation of different points of view, quite as much as the contribution of the variety of expert knowledge, will make this a profitable occasion for everyone.

2) But besides this methodological aspect, I feel I must also emphasize how close the theme of this Conference is to the basic preoccupations of the OECD countries in the coming decade, preoccupations which can be summed up in the two objectives of economic growth and the improvement of the quality of life.

a) "Il n'est richesse ni force que d'hommes" /Neither wealth nor power can exist without the men to create them/. This observation made four centuries ago by the economist Jean Bodin is as true today as ever it was.

The existence of qualified people remains an essential condition for the creation of wealth. If proof, based on more recent experience, were needed that a prosperous economy can be built up in a region poorly endowed with natural resources, this is provided very strikingly by modern Japan.

Economic growth today, depending as it does on technological innovation and the development of technologically advanced industries, obviously requires growing numbers of qualified personnel, not only in industry but also in the services sector.

This means that the growth target of 65 per cent of gross national product which the Member countries of the OECD have set themselves for this decade cannot be achieved under satisfactory conditions unless this problem is also solved.

b) However, when the OECD Council at last year's meeting at Ministerial level decided on this growth target, it took care to point out that growth is not an end in itself, but rather the means of achieving a better quality of life.

This theme of the "quality of life", which has such a profound influence nowadays on all our thinking about economic and social development and the activities of OECD is not irrelevant here today.

Indeed, if human progress is not to be expressed solely in quantitative terms - whether of production or of income - but also in qualitative terms, then it is right and proper to take into consideration not only the economic efficiency of the educational system but also objectives such as security of employment, equality of opportunity and ways of increasing the satisfactions which people can get from their jobs or the culture to which they now have access.

My second remark relates more precisely to the problem which will be considered at this afternoon's meeting, that is, of ensuring a closer alignment between future trends in employment and future trends in education.

My personal view is that this problem, which is not a new one, confronts us today in a much more severe form than in the past, and that, I believe, is why this Conference is meeting at a very appropriate moment.

If we look at the requirements side, we are bound to be impressed by the fact that in the industrial society of today the shortage of variously qualified personnel has become a chronic phenomenon. It exists not only in periods of over-rapid growth, which is normal, but also in periods of stability or slow growth. It is, in fact, a symptom of a structural change in the conditions of production.

The disadvantages of such a situation are obvious. These localised shortages not only constitute bottlenecks which hold back economic expansion, but sometimes give rise to serious distortions in the distribution of incomes which can make it extraordinarily difficult to apply a policy for prices and incomes.

Turning now to the resources side, the picture is again far from satisfactory. It is true that "the machine for the manufacture of graduates" functions efficiently in most of our countries. Statistics of enrolment and the number of certificates awarded are a proof of this.

But how disappointing it is to discover that in certain countries a disquieting amount of under-employment is emerging at the same time! This surely is the most unforgivable squandering of social resources, and, for the victims of this state of affairs, a very understandable cause of frustration.

It is therefore essential to achieve a better adjustment, and you are the ones from whom solutions to this worrying problem are expected. But in trying to fit the two halves of the puzzle together we must be careful not to underestimate two dangers:

- the first would be to throw the freedom of the individual to the winds and concentrate on solutions of an authoritarian nature. Whether the economy would stand to gain anything thereby I cannot say, but I am quite certain that the quality of life would lose by it;
- the second danger would be to underestimate the time factor. One of the difficulties of the problem is that higher qualifications can only be obtained after long training. It might be tempting therefore to impose rigid patterns of training based on present requirements, or, at best, based on future requirements assessed simply by extrapolating trends.

We must face up to the fact that forecasting - an essential tool for policy-making for employment and education - cannot provide us at present with the unique and unequivocal solution we are waiting for. We have no choice, therefore, but to think of training and guidance as responses to continuously evolving situations and therefore subject to constant adjustment.

One last remark about the results to be expected from your deliberations. The questions you are going to consider are complex and difficult:

- how are the economic aims of education to be reconciled with its social aims?
- what are the respective roles education and industry must play in the provision of training?
- what can be done to strengthen the links between educational institutions, employment services and industry?

Clearly the Conference cannot claim to provide final answers to these questions. It will however have been well worthwhile if, after examining the evidence contained in the many excellent studies which the countries represented here have helped to provide, those questions are put in more specific terms.

The aim of this Conference is to demonstrate that the traditional policies of the authorities responsible for employment and for education and those of employers and trade unions must be adapted to take account of the changes in contemporary society. It must also demonstrate that those policies can no longer be decided and implemented independently of each other as in the past.

It is not possible today to understand and deal with employment problems without reference to the problems of qualification and training. Neither is it possible to think that educational problems can be dealt with in isolation, without reference to what is happening in industry and without a clear understanding of employment problems.

Allow me in conclusion to express the hope that the exchange of information and experience to take place at this Conference will result in a realisation at national and international level of the urgent need for an integrated approach to the problems of education and employment, and that this new awareness will be reflected in the policies and institutions of Member countries.

II

Address by Pier Luigi Romita,
Under-Secretary of State for Public Instruction (Italy)

This Intergovernmental Conference, the first of whose tasks I have the honour to carry out, should, I think, receive particular attention. Under what is apparently a very specific and restrictive title, it has the merit of tackling a problem of great importance for the social and economic evolution of modern societies.

The main reason for the extremely rapid expansion of education - and particularly of higher education - in all countries over the past few decades, may perhaps be said to be the seeking after a professional role that is satisfying qualitatively and in general superior to the role of one's parents.

This "quality of work", the aim of social demand, is in fact constituted by a set of characteristics (such as a higher social and economic status, the possession and remunerated application of given professional know-how and technique, job security, escape from manual work), which - according to a century-old tradition - are tied to a high level of instruction.

For the first time in history, this aspiration has been helped by the mechanism of economic growth. This growth, in fact, made more family and public resources available for a large number of young people to continue their studies, and at the same time stimulated the "human factor" skill which scientific and technological conditions and the structural changes of the economy made necessary.

We see today, however, that this vast process of transforming society is not taking place according to a completely rational and consistent model. It contains contradictions that make it difficult to keep a balance - even if a dynamic one - between this type of social betterment and the requirements of the economy.

The lack of this dynamic balance is shown by the difficulties of employing the highly qualified personnel produced by the educational system.

In the course of this Conference we are thus led, through an examination of the qualitative and quantitative imbalances existing between education and skilled employment, to become aware of a vast series of problems affecting the fate of education and announcing a radical transformation of labour organisation and therefore of the social structure itself.

We have to recognize that OECD is particularly well placed to tackle this problem not only with the necessary sensitivity towards policy but also with the required scientific backing. It has now been confirmed as an organisation to study and promote educational policies based on an organic connection between school and society. This implies a continual interdisciplinary approach to education questions, and enables scholastic institutions, commonly accused of isolationism and sectarianism, thanks also to international comparison, to lay down their real role (and not their hypothetic one) with regard to the changing social context.

This reference to the characteristics of OECD's work is not only a recognition of its merit but is also essential to set historically the problem that is the subject of our Conference.

The activities undertaken in the past ten years show that the basis of the work of today represents a stage, a compulsory stage even in this continual comparison between school and society.

The first phase, centred on the economic aspects of education, draws attention to the problem of the requirements for qualified personnel as the fundamental condition of growth, forcing the political and business classes to consider investment in education also as an economic value. In spite of all the cultural and technical limits this conception of education certainly produced a beneficial stimulus at that moment. It made possible the inclusion of educational activities in the framework of economic programming, binding them to the policy of growth, and raising the education-employment problem.

The subsequent phase was marked by the fact that attention shifted from the economic to the social aspects. The fundamental aim of educational policy shifted from trying to improve the human resources to be supplied to economic growth to the pursuit of equality of educational opportunity as the source of social equality. This interest arose as a result of increased political

sensitiveness to this value, and also because it was seen that the expansion of the school population - though encouraged by measures providing aid to education - discriminated among different social groups mainly owing to the socio-cultural conditioning of children from the poorer classes.

But - and now we come to today's subject - educational policy cannot ignore that as the social differences affecting admission to education disappear and education gradually becomes general at increasingly high levels, the contradictions inherent in the relationship between the educational and the vocational systems increase.

When the poorer classes enter secondary and higher educational institutions, the latter cease to exercise their regulating function in the social and hierarchical sub-division of labour.

It is then that difficult problems arise, which are both social (competitiveness, frustration) and economic (waste of resources). The education-employment problem crops up again, but in the opposite way to that it took in the first phase. It now concerns the optimum utilisation of human resources that, at least in relation to the present economic structure, have become superabundant.

I should particularly like to draw attention to the fact that this phenomenon occurs in many countries, whereas the participation of the poorer classes in education has only just started.

When I think of the situation in my own country, I cannot ignore that whereas these symptoms of superabundance of personnel with diplomas and degrees are now evident, there is no doubt that most of the young people endowed with the intellectual gifts necessary to benefit from higher education are still outside the universities.

Our Conference, keeping in mind the present stage of relationships between school and society, must now deal with the subject of the utilisation of qualified personnel. I should like to recall here the general orientation of our work.

The fundamental points of the analysis we are to carry out consist of the problems of employment, career, and the training of highly qualified personnel. We shall then draw from this an indication of what new facts will have to appear in the institutional field and in that of political action, in the next few years.

A. We shall first look at the conditions and prospects of employment. Do the trends of economic and technological change entail a high quantitative increase in demand or not? And what will be the characteristics of the new posts that become available?

Recently we have seen that the creation of new posts is due almost entirely to commerce and services. Since the nature of this sector calls for a high percentage of skilled workers, the coincidence between the expansion of education and that of the tertiary sector has so far ensured a certain balance in the utilisation of personnel.

We should like to examine under what conditions this balance might also be possible in the future. In any case, an examination of the problem of highly qualified personnel in the tertiary sector, and particularly in the civil service, is of fundamental importance to us.

We shall then have to ask ourselves what is happening in the other sectors. In industry the percentage of qualified personnel in the total number of workers is rising rather slowly. Will this trend continue to be so slow?

Are we to imagine there will be organisational and technological "leaps", or rather that there will be an increase in productive activities that call for a high degree of training for the staff employed in them, so that, in this way, there will be an acceleration of demand for managerial and skilled personnel in the industrial field?

In any case, in making our economic analyses we must not forget a completely new fact: namely that the excess of highly educated personnel creates different conditions from those of the preceding regime of shortage.

Demand, in fact, will be positively influenced by the superabundance of the supply. This fact may encourage, for example, a more extensive employment of skilled personnel in services of collective interest. Furthermore, the economic activities of private individuals will be directed preferably towards sectors that imply the utilisation of the skilled personnel now available on the market.

I am formulating hypotheses. I am mentioning problems. It is not my task, neither am I competent, to delve to the bottom of them. Our work of the next few days will enable us to define these questions.

It seems to me important, however, that we should finally become far more aware of the prospects for employment offered by the growth of education and the possibilities of utilisation. Will under-utilisation be really inevitable in the society towards which we are moving?

In this framework some indications will also have to emerge concerning the qualitative problem: in particular the bottlenecks which exist in the relationship between the level and the type of school training and those of potential demand must be brought out.

B. The change in the situation of training and employment inevitably entails consequences for the mobility and the career of highly qualified personnel. I should like to draw your attention to the social consequences that may ensue, with special reference to these three phenomena:

- the intensification of competition for access to the limited number of responsible posts;
- the frustration and vocational inadaptation of those who, although they have attained a high level of education, are excluded from the careers for which they have been prepared;
- increase in vocational mobility as a means of combating the under-utilisation of highly-skilled personnel and, at the same time, fewer possibilities of promotion for workers who have not acquired a high level of training.

The present conception of professional mobility and organisation of work is brought into question by these phenomena. There will be positive effects, it is true, such as higher qualifications for executives and vocational staff in posts of high responsibility; generally speaking, however, things cannot remain as they are and through the work of this Conference we must make an adequate contribution towards solving the problems of restructuring the functions and careers of the workers.

Social behaviour, too, will be able to give more attention to values of equality and solidarity and concentrate less on competitiveness.

C. We are aware that most of the problems raised so far call for long-term solutions outside the scope of a programme of immediate action, or may represent even inevitable and perhaps positive stages of social evolution.

But we are not denied all possibilities of immediate action. One of the fundamental motives of this Conference is in fact to study the function of supplementary and recurrent training as an instrument to improve the utilisation of the potential of qualified personnel at the disposal of society.

I think that the correct approach to the relationship between training and utilisation is based on the three following factors:

1. harmony between academic training and future professional career;
2. the process of qualification closely linked to the entry into a trade through technical and practical preparation;
3. the process of supplementary or recurrent training during one's career.

The empirical work carried out by the Italian Commission (the results of which are presented to this Conference), has shown clearly that at present the first two factors are particularly important, whereas activity connected with the third is not yet a widespread need. For many reasons that I shall not enumerate here, in the future this third aspect will probably assume an increasingly important place in the individual's training.

It seems to me that, particularly with regard to industry, the separation between academic training and utilisation in industry is very marked. In this connection the following general orientation prevails today: "The school cannot give complete vocational training; this training must be sought elsewhere. On its side, however, the school system must thoroughly readapt itself to the new training needs". This is a broad working hypothesis that we shall have the opportunity of defining these days.

I am in no doubt, however, particularly as regards my own country, that we must go further than rigid scholastic patterns to make advanced level training more supple, more individualised, more varied and more articulated. In particular we should bank on advanced educational institutions with two characteristics: modular-type training, and a much closer link-up between the theoretical and scientific element and its application to the real problems of vocational environment.

It is more and more difficult, however, for young people to obtain a real vocational skill in schools. It is better, in my opinion, to recognize explicitly the existence of post-school training

in close liaison with productive and vocational activities, and consequently to give it greater attention. In particular, it would be useful to study, with attention to action that has already been taken, how this can be institutionalised, financially supported, and recognized. It should preferably be regulated by labour contract, and be applied, in particular, in the form of a competitive course at the moment when young candidates enter the civil service.

By tackling problems concerning supplementary and recurrent training during one's career, we add new elements in favour of the evolution of education towards new functions. The main idea behind this trend seems to be the spreading of the time and money used for training, at present concentrated on courses for young people, over the whole of the vocational career.

D. Finally concerning the institutional and policy conclusions we shall have to draw, I think this problem must be dealt with simultaneously in a number of ways to get a satisfactory solution. Today, forecasts of the utilisation of qualified personnel cannot be made either from purely economic or purely social estimates; but from a dosing and blending of the two. Similarly, those who consider the central problem to be qualitative and concentrate on the improvement of training structures and of labour mobility would be losing sight of the basic trouble, which is quantitative in origin.

For this reason during the next few days we shall have to bring to light the shortcomings in training and at the same time examine the guidance and selection for students in higher education. And, while we try to identify the trends of the evolution of modern economies so as to forecast the corresponding evolution of the demand for qualified personnel, we cannot avoid bringing into discussion the present consolidated system of social stratification and division of labour.

In any case, the main lines of institutional and policy trends, and the harmonization of action taken by OECD countries cannot be outside the following basic principles:

- not only not to stifle, but on the contrary, to encourage in young people a desire for cultural and intellectual improvement, by opening every school door to all of them;
- continuously to transform education, not only in line with the present demands arising from social development and

production but still more to provide a general overall preparation, so that the young are taught at school in particular how to study and get on in life;

- to keep in mind the ever-growing problems of employment and leisure, and subsequently understand and appreciate such objectives, not only as the "quality of work" but also the "quality of life";
- to organise greater joint responsibility as between industry, production and society concerning the specific skills of young people.

If we follow these principles, we can ensure a positive reply to the short-term problems of training and utilisation of highly qualified personnel. We can also actively serve the personality and liberty of the individual which must constitute the indispensable counterweight to the inevitable creation, in the world of production, of even bigger firms, more powerful, more impersonal and therefore potentially more authoritarian, and in which only the conscious participation of beings who are free and masters of their intellectual life can democratically ensure real human progress.

III

Address by Malcolm R. Lovell, Jr.,
Assistant Secretary for Manpower,
Department of Labor (United States)

I think that when we are considering the utilisation of highly qualified personnel, we should not put ourselves in that position first. I don't know how many of you have tried to assemble a child's toy at Christmas, perhaps to cook a complicated dinner when one's wife is sick, or even start the lawn mower, but being highly qualified is relative, as Mr. Haldén pointed out this morning, to what one is trying to do.

It has been argued that those who are highly qualified should decide for themselves what is to be done and do it with vigour. But I suggest that perhaps those who are highly qualified should be called upon to do the work of the world that needs doing and perhaps that should be defined by the market place, by the political and social forces of the time, rather than by those who are doing the work.

We have heard a great deal of talk today about the need for higher education and considerations of status and prestige, whatever they may be. In this regard, I am reminded of an American philosopher, if I may call him such, by the name of John Gardner, who said that a society which places more faith in a bad philosophy than in good plumbers will find that not only will its pipes leak, but its philosophies will have holes too. I suggest that we need to think very seriously about the challenges of our time and to adapt our education systems to give maximum freedom of choice to the individual within the restrictions of each nation's needs, recognising that these needs vary from nation to nation. A nation which is just developing a technological society will have different needs from others that are already highly developed. I further submit that as we approach the problem of highly qualified personnel, we need to think not only in terms of

the magnitude of the needs of a society in its particular stage of development, but of the quality of those needs, as well.

You heard this morning from Dean Wolfbein that the city of New York is now allowing access to public-supported higher education to anyone who graduated from high school. This meets a particular social need of New York, because of the feeling of isolation which both the Puerto Rican and the black community have in that area. In meeting that particular social need, this change may seem to make sense. But, more generally, to say that anyone who completes a programme in high school - regardless of content or quality - should automatically receive public support to take four more years of higher education borders on the ridiculous.

I would like to make one other generalisation. As we consider the values that are important in society at any particular time and attempt to measure them, we need to give a great deal of thought to the process by which these judgements are made. We have at the Conference this week both educators and manpower people. Thus, one of the recurring topics has been the inter-relationship between education and manpower. I would like to suggest that one of the responsibilities of those of us in the manpower field is to help to determine for the educators the work tasks that are in demand - those that are in demand because of the requirements of the industrial society and the political society. Up to now, I think, it has been demonstrated that educators, who are trying very hard indeed to be sensitive to the needs of their society, have not had the tools to do their job well. In the United States, no group has less help in its task than those who are in charge of developing a curriculum that represents, for the bulk of the graduates who do not go on to college, a terminal relationship with the educational system.

For those who do go on to college, the universities pick up the important task of preparation for work and citizenship, but no one, no group, is able to define the subject matter for those who do not go on. I think perhaps this can be the role of the manpower people. We have the capability and the obligation to assist secondary-level educators in determining needs, the locations, and the numbers of future openings, so that those developing curricula at the secondary level are in tune with the realities of the labour market.

Indeed, I might also point out that there is very little help being given to the universities in their efforts to determine

what is to be taught, and so very often, lacking this help, they continue to teach the things that were taught before, for the same length of time. In the United States Department of Labor today, we hear much criticism about the apprenticeship system and about the technical training system. But I think we have to recognise that the system of higher education needs as much help and as much redefinition of mission as does technical training. Our joining today in these discussions is an important step in furthering the needed association between educators and manpower specialists.

IV

Address by Folke Haldén,
Swedish Employers' Confederation, representing the
Business and Industry Advisory Committee to the OECD

When we think of academic education we tend to forget that the universities were originally schools to prepare for such tasks as were needed in a society beginning to organise itself, for example, for such professions as clergymen, clerks, teachers, judges. Society has, however, changed and so have its needs of knowledge and skill. The pattern is more diversified and constantly changing. Society today bears the stamp of industrialisation which makes a deep impact on the whole of our existence. "High" and "low" levels no longer mean the same as they used to do and, in fact, this type of classification tends to become irrelevant. This statement applies to modern organisational philosophy.

It would seem appropriate to recall, as many circles appear to have forgotten, that we live in an epoch that is dominated by the mass-production of goods and the mass-distribution of these goods, in short by industry, whether we like it or not. Socialist countries, so-called Popular Republics and capitalist States all live on industry since agriculture has also become industrialised. Industry is what developing countries are longing for, industry is the answer to the desperate cry for a solution to the existing and threatening mass starvation among the rapidly growing populations of the world.

It would therefore appear of great importance to give strong support to this "pièce de résistance" of modern civilisation until something else is found to take over its position and task. How to develop this basis for our existence, how to provide it with the necessary knowledge and skills for present and future needs, with new ideas and new intellectual potential, seems to be a worthy theme for co-operation between all interested parties, for the whole of mankind.

Therefore it is with great satisfaction that the Business and Industry Advisory Committee welcome this opportunity to take part in this OECD conference in enthralling Venice. Management has accepted offers to be represented in the national delegations where such opportunities have been given, and the BIAC representation is, I believe, more numerous than usual at conferences of this type because we consider the subject of great importance, and want to demonstrate our intention to contribute to it.

This also seems to be in accordance with the conclusions of the Paris Conference of 1966 on the same subject.

However, I must start with a protest on behalf of BIAC against the title of the conference. We do not want to be considered "utilisiers of personnel", but of knowledge and skills, which is something different. With this reserve I want to make a few statements, based upon discussions within the BIAC working group on education.

Business and industry are not the only utilisiers of knowledge and skills, but one of at least three major interested parties. Society as such has its needs that should be amply provided for in order to develop democracy - that most demanding system of living together - to spread ideas and views, to care for those in want, etc. Individuals should be given opportunities to acquire knowledge in their own right, for their own personal interest and development. That is, as we understand it, what is meant by culture. There is, however, a difference between these three goals for education that may reflect a financing problem and priority if necessary. Education for the needs of society and most particularly education for working life may be regarded as investments for the common good, whereas education for purely individual motives is more a sort of consumption. It is doubtful if consumption should be financed by common funds.

When, during these three days we discuss the connection between higher education and employment, we think complete concordance between the two would be difficult to justify.

Industry cannot be expected to provide adequate employment for everybody who has been given some form of higher education in the traditional sense, and the education establishment cannot be expected to take into consideration exclusively the needs and wishes of industry and particularly not short-term and direct needs. In a longer-term perspective we may hope for an adequate utilisation of knowledge for all and everyone.

It seems justified however to think that both society and individuals consider that employment should be as adequate as possible. Underemployment, and more still unemployment, is a waste of time and money invested in the education even though the individual may feel satisfaction at his knowledge and wisdom. For industry and business it means wasted and unused potential.

The present imbalance between supply of and demand for people with higher education - particularly general academic studies - is due in most highly industrialised countries to an expansion in the field of education that has been more rapid than the corresponding needs of society and of industry. In the same countries, however, the total growth of population has been far less rapid, so that the supply of people with different types of qualifications from these, often referred to as "lower", is proportionately reduced. Therefore redundancy and shortage appear at the same time, as though in communicating vessels.

This leads us to our second protest against the title of this conference - or rather to a reservation: only in a few exceptional cases can a person be qualified per se, except in relation to a specific task. Hence, academic training is not automatically the same as high qualification, a Ph. D. can in fact be completely unqualified whereas a person with apprenticeship or vocational school training can be fully and adequately qualified.

The substantial growth in the number of graduates consequently increases the competition for the jobs in the sector of the labour market where such training is in demand but may have the opposite effect in other sectors. This inevitably affects the price of labour but, apart from this, there may be unemployment among those with long theoretical training if there is not at the same time a rapid growth in demand for these skills, or if these persons cannot or are unwilling to take other jobs in competition with non-graduates.

It seems unrealistic to maintain that industry's needs of knowledge and skills should change at the same rate as that of the present expansion of higher education. We may subsequently develop in that direction if we survive to see that seemingly distant future. Consequently those who for any reason want to have a higher education should try to get alternative qualifications, not necessarily at the same level but distinct enough to provide an entrance ticket to the labour market. Academic training, in the form of, for example, analysing capacity and a

scientific approach, would prove its value only later on in the person's career or perhaps after the first promotion. This, again, draws the attention to the fact that knowledge at this level, as at other levels, cannot last for ever without rusting. Refresher courses are necessary also for those who have spent a long time at schools and universities.

To sum up: we do not believe in any such thing as overall qualification, a ~~passé-partout~~ to suitable employment. Nor do we believe that it is possible to qualify once and for all, that knowledge acquired at 20 will automatically be valid at 50.

As others will no doubt comment on the needs of society and of the rights of the individual to study for his own sake, BIAC may perhaps be permitted some brief comments on the structure of higher education. We find there is considerable danger for students in a prolonged stay at school or university until the age of about 25 under the direct influence of people who, however intelligent or knowledgeable, nevertheless have a fairly limited experience of the life for which they are preparing their students, and where they are living with only a limited selection of fellow-citizens under what might be termed laboratory conditions. The university campus is not a true copy of life. Therefore industry would welcome a further development of the idea called "recurrent education" or a "sandwich" system where the students could experience living conditions outside school at an earlier stage. Such a system could also provide for the underprivileged in the older generations. Industry would also welcome a system in which practical subjects could be combined with traditionally academic subjects. Just as sociology is a younger academic subject than philosophy so we might reasonably expect new contributions from our own period. Could not welding or turning be academically treated and taught as well as anaesthetics or hymnology?

In short, BIAC believes that the structure of higher education should be reconsidered so as better to meet the needs of everyday life, and that the classification "higher" could and should be applied also to a deeper study of the knowledge and skills necessary in our diversified and rapidly changing society.

BIAC also believes that enterprises have to adjust themselves, to reconsider their attitudes. The future needs of manpower must be considered not in terms of categories, such as economists, engineers etc., but of knowledge and skill. Such an attitude could lead to new combinations of people, new aspects of personnel development, new patterns of organisation. It might, in

fact, lead to a completely new evaluation of the services rendered by the personnel, to a system of value analysis also in the field of personnel.

The views expressed here on behalf of BIAC may seem discouraging to some who base their expectations on traditional higher education. They may however also be a challenge, not least to our friends from the educational institutions. We very badly need some new thinking now that we are in a phase of industrial civilisation that calls for much intellectual effort. We have had some scourging criticism from the academic side. This Conference may turn that criticism into constructive thinking. This would be most welcome, and BIAC representatives will gladly make every contribution within their power.

From our side we are fully prepared to co-operate with the ministries concerned in the respective countries as well as our labour market counterparts.

V

Address by Robert Cottave,
Secrétaire général, Fédération nationale des ingénieurs
et cadres supérieurs (Force ouvrière), France, representing
the Trade Union Advisory Committee to the OECD

On the theme chosen by the governments of Member countries, our intentions are to arrive at a better appreciation of our responsibilities, to throw more light on our decisions, and to ensure greater freedom of choice on the part of those whom we represent.

I am not going to make a formal statement, as might befit the beauty of this Hall, or the high level of the statements we have so far heard. With our present knowledge - still incomplete - of the documents, I shall confine myself to a few working notes and, since times are changing, and since the employers have already made strong protests, I shall content myself with saying how very valuable it seems to us to make use of this opportunity; that is to say, to profit from the fact that we do not need to convince or to negotiate, but merely to widen our understanding of ideas and facts.

In our view, this Conference already constitutes an element in the development of research into the trend of the supply of and demand for labour, and it is for this reason that the trade union organisations take a special interest in it.

The exchanges which have taken place in connection with this Conference, the knowledge which can be assembled and the diffusion which can be given to it on the occasion of an international meeting seem to us to be so many favourable elements in the pursuit of an active manpower policy which the trade unions have been advocating for many years past.

The trade unions have measured the importance of the development of highly qualified personnel, an importance which is to be found in demography and in the continued expansion of the education systems in our different countries. It seems to us that this

change of dimension is merely a better illustration of the present concept of full employment. Full employment today no longer merely meets the need or determination to provide work for everybody; it now implies making the best use of each individual, and, of course, the full blossoming of his capabilities. Up to now, employment policy has usually been of the cyclical type. It must become - and this is well illustrated by the example of highly qualified personnel - a long-term policy, that is to say, the construction of a project for each individual. This is why it is of the utmost importance to be able to devote more and more resources to throwing light on manpower needs and their trend, as well as on the development of the education system.

The study of each of these two phenomena, in the light of the other, enables us to make progress in describing the relations which are being established between training and employment. The proceedings of this Conference will take stock of the knowledge acquired as well as of the available techniques of investigation. But they strongly emphasize the volume of research which still has to be done and all the work which must be undertaken if policies and programmes are to have any chance of being soundly formulated. We look to this Conference to assist in bringing out these needs for research and in defining the fields to be covered and the resources needed for success.

The knowledge acquired in this field - and this is the second point on which we look to the Conference - deserves the widest and most immediate circulation. We hope that the wealth of documents assembled will have the widest circulation in Member countries. The elements of forecasting are valuable not only to the policy-makers and the programmers but also to every individual who, in the last analysis, must be the prime decider in matters of training and employment. Here again we are convinced that this work will help to provide material for the information, guidance and counselling services which are developing as the instruments of an active employment policy.

But in the case of highly qualified personnel, the most important question seems to us to be connected with education itself, and, of course, with its relation to employment. The way in which educational curricula and institutions on the one hand and manpower policies and employment procedures on the other, have generally developed independently of each other, now stands condemned.

The trade unions are campaigning for training time to form part of the labour contract. This is a concrete way of showing

that the full employment of skills is impossible without the continuing maintenance and development of these skills. In this connection, we look to the Conference to stress the importance of continuing training. We believe the time has come to envisage education programmes which extend and remain up to date throughout working life, and that the labour contract should reflect this new reciprocal obligation between employer and employee. The link between employment and education cannot and will not be an abstract objective. It is the whole organisation of working life which should effectively link employment and training, and I say again that the inclusion of training time in the labour contract is, in our view, the first decisive step.

Furthermore, in a world where the interaction between the development of lifelong education and the trend of employment is bound to grow, it is urgent to ask what are the institutions and arrangements whereby the free choice and the free determination of individuals will be guaranteed. This is one way of forecasting. You are no doubt as familiar as I am with the saying of the Eastern sage that forecasting is difficult, especially when it relates to the future. Well, forecasting, and this is only another way of saying it, is, after all, merely a sound knowledge of the present and of its capacities and its potential. We are therefore satisfied when research is intensified, particularly when it comes nearer to man and gives preference to the psychological and sociological aspects and when it throws light on the exercise of individual liberty.

The study of the problems of highly qualified manpower can no doubt help to give a decisive orientation to the situation reached for all wage-earners. This is a point which we have constantly in mind when we note that the group of highly qualified personnel, though growing, is still in the minority. We note that when one looks closely at what happens in the life of each of these individuals we find that, in the last analysis, it foreshadows what will happen to all of them. We shall have occasion in the course of this Conference to describe the unemployment problems experienced by highly qualified personnel. They have no common measure and they do not call for any of the measures so far taken, since they are mainly troubles of a psychological and sociological kind. Finally, it seems to us that the answer to problems of access to jobs, that is to say promotion to highly qualified posts, should be at the very heart of the work done. Are the relevance of curricula, the intensity of continuing training and strict forecasting

of employment needs sufficient to ensure freedom of access and equality of opportunity? We do not think so.

One of the reports describes the importance of new forms of activity on the fringes of traditional education. One might also ask about the growing place taken by mass media, the working environment, the family environment, the way of life and what men are capable of learning in the way of new knowledge and behaviours. We think that, on this point, as on so many others, it is the whole situation of the working world which should be examined. This indicates the extent to which the problems we are studying today have a growing place in general policy and how they interact with economy, science and culture.

Mr. Chairman, we look to the Conference to recall, in connection with these problems of highly qualified personnel, that employment policy is today one of the main issues of a country's general policy and to repeat an expression which you yourself have used, Mr. Chairman, and which the Secretary-General of the OECD has used: "the solution which we find for this problem of employment policy will determine the quality of the life which we are preparing".

VI

Address by Dean Seymour L. Wolfbein,
School of Business Administration, Temple
University, Philadelphia, (United States)

As I'm sure that all of you know, it makes a big difference where you are on a Programme. I happen to be towards the latter part of the Programme this morning, which has at least two advantages, one, you can take advantage of what's been said before, and secondly, you can be much more brief. I will take advantage of both of them if I may.

I have prepared a paper as so many of you have, and the scenario was that I might recap and summarize that paper, but I think that that would be gratuitous. Those of you who are interested will read it, those of you who may be less interested may read the summary. What I would like to do this morning very briefly is something quite different.

As we get closer to discussing the more practical questions in Groups I and II, I thought it might be helpful if I could summarize very briefly in just a few points what we have learned in a very practical way in the five years since our first Conference in 1966 on this subject. Perhaps as a framework, as a context, as a milieu for all of us, as we go on to deal with the practical problems of the subject of this Conference, this is what I would like to summarize as follows: If you want a title for this, perhaps a good title would be "What have five years brought, what have we learned from the dynamics of 1966 to 1971?" Again taking advantage of my colleagues who preceded me, let me enumerate just a few.

1. This emerges very clearly, I think: Highly qualified manpower, as we like to call ourselves, are very clearly not an autonomous group - we may be high, we may be qualified, in fact we are highly qualified, but we are manpower and as such it turns out, as the last five years have shown, and has been noted already by a

number of speakers, we are part and parcel of the labour force as a whole. We have our own special problems, but overridingly and surpassingly important is the fact that we belong to the labour force as a whole and nothing has underscored this more than recent developments, which have brought about what we politely call imbalances or perhaps more realistically call unemployment among our colleagues who are highly qualified manpower.

In the USA, for example, recent policies have changed what was always a cliché in the manpower field i.e., that highly qualified manpower are the last, or certainly next to the last to experience disemployment when changes take place. It was the lower qualified manpower, such as the unskilled and the semi-skilled, who were supposed to be hit first. It turns out in a number of countries, and this is true of the USA, in the last half year or year, that one of the first to bear the brunt of disemployment, both in magnitude and in sequence are our friends called highly qualified manpower. I don't think we have approached disaster, but in the fog this morning as we were embarking on the boat, one of my distinguished colleagues here in the Delegations tells me the unemployment rate recently among engineers is about 3-3½ per cent. Whether this is high, low or medium, I leave to your judgement, but it's much higher than it used to be. Among physicists, another very highly qualified manpower, people in the field of computer science and the information sciences as well as engineers have been among the first groups to bear the brunt of recent disemployment. And so I think it's true that we have to emphasize this at the beginning, this point No. 1, that highly qualified manpower now has a slightly new cast to it, perhaps a little tarnished, but nevertheless real life.

Some of the writings of the recent past, for example such as those of Dael Wolfle, who's here from the USA, in the material he's prepared for Science Magazine and in his new book based on his lectures at Princeton University, begin to show some of these new trends. Similarly, Secretary Lovell says in his basic paper concerning the 1970s that some of these imbalances may actually be exacerbated.

2. By the same token, I think it has become clear that while we may focus on manpower and education and career development and continuous education and recurrent training, and all these other

concepts that we are going to discuss in the field of manpower education (and this is slightly underscored by our distinguished representative from the OECD, Mr. Eldin), that you have to view the problems of highly qualified manpower in the setting of other policies and programmes, particularly economic policy. It turns out, and perhaps we needed this lesson, that we are not immune to the ebb and flow of economic policy.

I am intrigued, as a matter of fact, that in my own country some of the highly qualified who develop programmes and policies in the economic field could very well have generated some unemployment amongst some of their colleagues in other fields who are also highly qualified manpower, and so we have to put these things together. Manpower and education policy has to be seen in the rubric, in the context of economic policy, and work policy, of incomes policy and all the rest. I don't think that this needs more words, so I'll run on to Item No. 3.

3. This point, I think, is again underscored by the last few years, which shows that any discussion of highly qualified manpower, no matter how we define it, also has to be put together with the mosaic of some of the manpower who work very closely with them. I call your particular attention to the exceptional paper by Dr. Matthews of the USA in which he discusses this very specifically and concretely; the very trends in terms of supply and demand in education and training of the associated, supportive, as we call them, personnel surrounding the highly qualified manpower, and who may be the crux of the matter for the 1970s. How we put together that package, that constellation which work in these various fields, may be one of the important issues that we are going to have to contend with.

It's very interesting that in many countries all over the world I have visited, the fact of being less than highly qualified manpower is a matter of status. And I know I, and my colleagues, have gone around my country bewailing the fact, decrying the fact, that people below highly qualified manpower don't seem to have the status, and we have asked what can we do about this, and I have found that generally two pathways are taken. One is to try, mostly by talk and persuasiveness, to indicate to our friends outside the high qualification class, that they too, have a very important job to do. That has always seemed to me as rather condescending. I think the 1970s are going to see another pathway that will endow this other personnel with the status and with the

life-style and with the education and training that highly qualified manpower have. Just before I left, I talked to some of the people who represent so-called supportive personnel and they made a very interesting point to me. They said "You are going to Venice to San Giorgio, for a meeting. We never manage to go". A very interesting comment isn't it? The difference is one of life-style among the different groups.

An indication of what may be happening is illustrated at our University where this year we have set up a College of Engineering Technology, not a College of Engineering. There are many Engineering Colleges in the USA, many in my own state, many in my own city. A College of Engineering Technology, however, is different, and it will endow some of these supportive personnel with a university education, and I shall be interested to get comments from some of you later on this afternoon and tomorrow on what you think of this, which will endow them with the credentials and with the diplomas and the degrees and hopefully with a good curriculum as well, so that they can join us.

These first three points, if I may go over them very quickly, I think imply that the last half-dozen years, the last five years, the last year have made us take a new turn, and a new look at what we call highly qualified manpower.

And now point No. 4.

4. I think the past few years have emphasized the great need to take another look at the institutional arrangements which exist in our various countries, and the overriding impact they have on what we are trying to do in the organisation, the education and the training of manpower. And again if I may, I'll give an example, from my own country, not because this is the model - I suspect it is not - but simply to give an example of what's happening right now in this academic year, which in my country began in September, only about a month ago.

As we try to adjust to some of the imbalances which have been mentioned already, in a state such as New York, which has the second largest college/university system in our country, the man in charge has decreed that there will be no new Ph.D. programmes anywhere in the state - period. Now I happen to be a consultant in a number of those colleges and they are complaining a lot because they were coming up with what they thought were brilliant new programmes. The answer is NO, because of the imbalances, no

new Ph.D. programmes across the board. Now in the State of New York there is a city called New York with which some of you must be familiar. In fact, I've seen some of you there. Now in the city of New York which also has a university system, this is the second year of operating what they call an open admissions policy, where everyone who graduated from high school may enter the university. Now can you imagine the impact that this has had on the demand for teachers and for all sorts of highly qualified manpower including the people who have to find where to put thousands of new university students just in terms of physical space? And so, within the same piece of geography we have emphasized the fact that in a country such as USA, which has a federal impact, a state impact, and a local impact, those very institutional arrangements can have all sorts of different and often opposing effects on how we go about coping with the various problems of highly qualified manpower - which leads me to the 5th point and almost to the end.

5. If anything has been underscored in the last few years, it's been the continued problem of how to bring about some kind of rational co-ordination in all the programmes and policies that deal with highly qualified manpower. And no matter how we define "rational" and there are many, many differences, and no matter how we define "programmes and policies", it's an intriguing question indeed as to who has the responsibility, not only in government, but in industry as well, who really has the proper responsibility for pulling the strings together, as we say, and making some kind of coherent overall policy regarding highly qualified manpower. This problem has to be tackled and more forcibly than ever during the 1970s. These last two points bring out the difference in our institutional arrangements, and emphasize the need for some co-ordination in rationalising the system.

6. Item No. 6 has already been said many, many times and I just call your attention again to the point. I think that every speaker so far has pointed out that the five years that have passed since the last Conference have, if anything, emphasized the dynamism in the changes that have occurred in our field. We become obsolescent in our dealings with knowledge, in ways and to an extent we never thought was possible in 1966. By 1971, we have even more examples of how very important it is to contend with the factor of change, so far as the individual is concerned. Item No. 7, which I come to now, has not I think received much emphasis.

7. This appears in the paper by the Secretariat which tries to give us an overview of this Conference(1). Perhaps you recall it, those of you who have read it, just one sentence: it emphasized the fact that not only do we, as highly qualified manpower become obsolescent because of change, but so does the firm, the employing institution, and what do we do about that? What kind of plans do we have for the obsolescence of goals, of products, of services, of curriculum, of government programmes? They become obsolescent too, in the face of change, and I think one of the questions we should also take a look at is how do we consider these aspects jointly. The change in all of us as individuals and the endowments we have, but also the changes in the institutions in which we work, is a problem which really has not had so much attention as the one affecting individuals.

8. Now to come to the final point, which I think is very important in an international Conference, and I hope you won't consider it gratuitous for me to call your attention to it, because you obviously all know it: that the past five years have emphasized the importance of highly qualified manpower in a comparison of the relative advantages of the various nations.

Being an older man, I remember that, when we went to school and talked about comparative advantages among nations, we talked about the physical resources, about who had the coal power, and who had the steel, and who had all the other great physical resources in the world. Today, when considering the international scene, if one tries to promote co-operation among the various nations, the comparative advantage, if that's the correct term, lies increasingly with the talent, the hands, the skills and the knowledge of the highly qualified manpower that we possess. It's even true within nations, certainly true within my own country, where one out of every six jobs is located in just three states for some very important manpower reasons. And so I end (and as I come to think of it, I think this is the way I ended five years ago) in my brief presentation, with a definition, or perhaps a goal, which I submit to you, with all respect, for the next few days: Perhaps the crux of the matter as we go to work is to answer the question "How do we endow individuals and institutions with the adaptability, the manoeuvrability, the responsiveness which is required?" There is one sure thing that all of us know:

1) Cf. Part Two, I.

that there will be a change in the relationship between what we have learned and what we are going to be called upon to do in the immediate years ahead.

"How do we take advantage of the inevitable changes which are going to occur, in the relationship between what we have learned and what we are going to be called upon to do?"

Part Two

MAJOR POLICY PROBLEMS

I

OVERVIEW

by Léon Ter-Davtian

Directorate for Scientific Affairs, OECD

The present Conference follows on from the one held in Paris in September 1966⁽¹⁾. Its purpose is to take stock of the activities which have taken place in the intervening five years and to map out the paths to be followed in the years ahead.

THE PARIS CONFERENCE AND ITS CONCLUSIONS

The Paris Conference began by taking stock of the situation at that time, and culminated in a series of conclusions, recognised by most Member countries as being well founded.

The situation was established as follows:

The links between education, employment and the economy have not in general been the subject of any systematic co-ordination. The educational system, vocational training, employment and economic policy have developed separately with distinct aims. This situation has its roots in history and in an insufficient awareness of common needs. It is for this reason that constant attention should be paid to the aligning of these different approaches and to the preserving of the overall balance of the physical and financial resources in economic development.

1) Intergovernmental Conference on the Education and Utilisation of Scientific and Technical Personnel, Paris, 26th-28th September, 1966. Report published by OECD entitled: Policy Conference on Highly Qualified Manpower, Paris, 1967.

The conclusions reached concern:

The need to formulate co-ordinated national policies; to set up the appropriate machinery to put them into effect; and to improve our knowledge of the relationship between training and employment.

a) Formulation of national policies

The time limits of employment policy and educational policy have traditionally differed. Employment policy has been short-term while education policy has been medium or long-term, especially as regards highly qualified personnel whose formal education covers a long period. For this type of personnel in particular, however, a short-term employment policy is rarely applicable, since the changes that occur in the functions they perform stem from changes in the economy due principally to technical progress, the opening of new markets and the intensification of competition.

It is no longer possible to admit, as has been done - at least implicitly - in a number of cases, that the mass of qualifications evolves independently of the mass of training, the latter having to be adapted to the former. The volume of employment is of course a function of production and productivity, whereas the total output of the educational system is a function of its capacity and of the aspirations and aptitudes of individuals. On the other hand, while it may be possible to conceive of an educational system isolated from the rest of society, there is no type of employment which does not contain a formative element from the moment it is normally carried out. There is thus a continual interaction between these two "masses" which are only partly autonomous.

This caused the Conference to recommend that Member countries formulate "a systematic policy for education and utilisation" and in particular:

- i) provide better guidance for the younger generations in their studies, taking employment prospects into account; and
- ii) integrate the different ways of acquiring qualifications, at different stages of working life, into a coherent whole.

b) Institutional arrangements

To formulate this policy and put it into practice, the Conference recommended the setting-up of machinery to ensure co-operation between the different parties concerned with the problem of the relationship between education and employment: the public authorities (ministries of Education, of Labour or Industry, etc.), employers' confederations, and associations of highly skilled personnel.

c) The improvement of knowledge

Three recommendations were made on this point:

- i) preparation of an occupational classification better suited to the formulation of economic policy;
- ii) collection of statistics likely to facilitate dialogue between the education authorities and the employment authorities;
- iii) measures to encourage business firms to draw up, for their own use, more comprehensive and up-to-date information about their personnel, so as to make better use of the facilities put at their disposal by the authorities.

EMERGENCE OF NEW PROBLEMS AND PRESENT POLICY CONCERNS

Even before the Conference some countries had already taken action independently along the lines of these recommendations. All were encouraged to do so in the course of the preparatory work of the Conference and, in some cases, action has been taken at OECD's instigation. However, the acceleration of social change has been such that most of the countries have encountered problems which, even if foreseen, did not appear to be so acute a few years ago.

New conception of the utilisation of highly qualified personnel

This term, which is perhaps not the best one, covers all placement activities, allocation to the different fields of the economy and deployment of the aptitudes and knowledge of highly qualified personnel, in short its best employment.

The Venice Conference differs from its predecessor in two major respects. First, whereas in 1966 the memory of shortages of certain personnel was present in everyone's mind, the trend appears

to be reversing in a growing number of countries, at any rate for some specialist categories. Also, a wider section of the population is covered: not only are scientific and technical personnel concerned but highly qualified personnel with every sort of specialisation⁽¹⁾ defined very broadly: in addition to personnel whose level of qualification is that of a university degree, the supporting staff of this personnel, whose educational level is higher than that of the end of secondary school, are also taken into account: the better employment of the one is in fact strongly influenced by the existence and better employment of the other. As Mr. Matthews points out (Paper No. 26) three times more personnel of this level than of university-graduate level are required, yet all efforts have been concentrated on developing the latter.

The utilisation of highly qualified personnel raises particular problems: the very rapid expansion of the post-secondary education system which produces this personnel and their unsuitability in some cases for the needs of the economy, are the causes of substantial, essentially qualitative, imbalances on the employment market (Paper No. 6). School seems to be a very inadequate preparation for working life (Paper No. 20).

As Dean Wolfbein and Mr. Blondel emphasize in Papers No. 1 and No. 15, it is true to say that the distinction between an employment policy for all manpower and one which is applicable only to highly qualified personnel is difficult to make and, up to a certain point, artificial and sometimes even undemocratic. Measures taken by the governments of the United States, Canada, and the United Kingdom (under the Industrial Training Act: Paper No. 13) or in France (Paper No. 15) concern all manpower, with no differentiation between levels or specialities; and the application of these measures is the responsibility of the government departments.

Nonetheless, highly qualified personnel do receive special attention and sometimes special treatment.

Unemployment of university graduates is a new phenomenon since the end of the war. Their re-training when unemployed, for a job of a level equivalent to that which they held formerly, is

¹⁾ Thus, the documentation covers economists (Paper No. 11), political science graduates (Paper No. 14) and medical personnel (Papers Nos. 12 and 23). (The analytical list of papers will be found in the annex.)

long and difficult. Their employment in a job in which their knowledge is used to only a small extent is one of the new features of our society: it is frequently the cause of disappointments, all the greater if these persons originally visualised a brilliant career for themselves.

Moreover, given the amount of public money invested in university degrees, their misuse represents a waste in direct proportion to the high cost of education at this level. The social return on educational investment seems to be in inverse ratio to the level of the degree (20 per cent for upper-level technicians, 12.4 per cent for holders of a first university degree, 2.7 per cent for holders of a doctorate (Paper No. 25)7.

There are no signs of any improvement in this state of affairs. For the past ten years education has been the chief employer of graduates, principally at the higher levels (master's degree, doctorate), a substantial proportion of whom stayed in teaching (70 per cent in Norway, 66 per cent in the United States, 54 per cent in Canada, 60 per cent in France)(1): the large numbers of jobs created in education are practically all filled and the rate of recruitment has slowed down considerably. Public authorities which, after education, employ the largest number of graduates, have also reduced their rate of recruitment. The same is true of research, and here the United States is a case in point: whereas the space programmes were the original cause of the "brain drain" to America (Paper No. 22), the cutbacks in these programmes are causing a turnaround, and a retraining problem now confronts the American government which has just passed the Emergency Employment Act of 12th July, 1971 (Paper No. 26). It is interesting to note in this connection that the number of engineers, technologists and researchers now unemployed - 65,000 - is roughly the same as the number of immigrants in those categories taken in by the United States since the end of the war(2).

Industry's attitude to university graduates is somewhat reserved, especially in countries where there are Higher Technical Schools or Institutes which apply selection at admission, as in some Western European countries. In Norway, for instance, even for

1) "Problems of Higher Education, Country Studies", Mimeographed documents of the Education Committee.

2) Le Monde of 22nd September, 1971.

research, industry prefers the "silvilingenieur" to university graduates with a degree in physical science (Paper No. 16). In the same way, one of the Yugoslav reports (Paper No. 10), which studies the qualities of managers having different types of education, notes that the best heads of industry are not to be found among men with the highest university degrees.

These are the reasons for the special treatment often given to highly qualified personnel. In France, for example, where the right to in-career training has been recognised for all workers, the proportion of executives who at any given moment are allowed to be on training leave is 3 per cent, while for the rest of the personnel it is only 2 per cent. Thus, too, many large firms have a special personnel management department for this category of staff as can be seen from the paper made available to participants by the European Association for Personnel Management(1).

POLICY PROBLEMS

In spite of the differences which exist between Member countries, a number of problems are common to many of them.

The following are the most important:

- vocational adaptation;
- improvement of personnel policies;
- knowledge of, and changes in relationships between education and employment;
- re-orientation of the educational system;
- co-ordination of activities at national level.

A. Vocational adaptation

This is undoubtedly the problem which has caused the greatest concern in most countries and given rise during the past five years to the largest number of schemes to reduce the qualitative imbalances observed between employment supply and demand. The importance which the public authorities attach to vocational training can be explained as much by the requirements of the economy as by the need to satisfy the desires of individuals themselves.

1) "Politique de carrière des cadres" (Management career policy), a study by the Institut d'études et de développement: Entreprise et personnel, 40, cours Albert 1er, Paris 8ème.

The forces of change described by Dean Wolfbein (Paper No. 1), namely technical progress and development of industrial structures, have produced a kind of working life which is particularly unstable and difficult to define: this is very far from the concept of the "trade" with its own technology and style of living. The very notion of a trade is being replaced by that of a function to be carried out in society and in the economy. Yet society and the economy continually require the performance of new functions needing qualifications for which no training is provided and which are sometimes complex and difficult to acquire.

Confronted by this state of affairs, dominated by the need for continual adaptation to the process of change, the executive feels lost. Having obtained the qualifications which presumably ought to guarantee a safe professional future, he finds it hard to admit that they have depreciated to such an extent that he cannot find a job. The discovery of this change in his situation is all the more traumatic in that it often happens suddenly at the time of a merger or re-organisation. Yet such staff have generally given good service for years in the enterprise for which they work, which has itself, too, often lost its drive and its relevance over the years. In fact it is the employing enterprise itself which has become obsolescent, thereby bringing about the obsolescence of its personnel: this is a considerable responsibility for a firm's top management, who often escape the consequences of their own inertia, which instead afflict their personnel and especially their executives.

Unemployment of executive-level personnel cannot be a matter of indifference to the public authorities: it represents a complete loss for the economy and poses a difficult social problem. Employment difficulties for such personnel are exacerbated by the arrival of young people from school or university who may prove to be competitors because of the lack of a clear career concept (Paper No. 6), although this does not prevent young people from having their own difficulties in finding employment: in the United States 5.2 per cent of science graduates were reported unemployed¹⁾.

The educational systems in all countries, having been forced to meet an increasing social demand, have been able only to expand without fundamentally changing the nature of their teaching,

¹⁾ NSF, 2nd July, 1971.

originally intended for a minority: in the United States, which provides the most striking example, 75 per cent of one age group had been at school for 12 years or longer, and nearly half the 20-24 age group had received some form of higher education. In the other countries, although the percentages are lower, there is the same tendency. Yet too many people come out of the educational system unprepared for working life, both because they have no professional qualification and because they do not feel motivated to undertake a productive activity, if they are not actually hostile to the idea.

The problem which is giving concern to the public authorities is therefore to "prepare those who come out of the educational system for working life"⁽¹⁾, for unless they are able to integrate into working life, the equality of opportunity which is behind the expansion of education may prove to be illusory. It is the concern over this problem, together with that of making the best possible use of executives during their career, which lies behind national efforts to promote adaptation, which in most cases take the form of training schemes.

These efforts, however, will not achieve their objective unless there is constant vigilance: as though by some process of fate common to all teaching establishments no sooner has a training scheme been organised and structured with a curriculum, expert instructors, examinations and a diploma, than it becomes cut off from the reality that brought it into being and continues to operate in an autonomous manner. Stretched to the limit, it may produce qualifications that answer to no requirement whatever.

The imbalances between the supply of and the demand for personnel are not only harmful to the economy, the development of which they hinder (and are doubtless one of the causes of inflation), but to the individuals themselves who become frustrated in their ambitions. The role which one plays in society bulks too large in man's life and preoccupations for him to feel really happy if his position in working life is too far removed from his aspirations.

Therefore, both in order to attain economic and social objectives and to meet individual needs, the authorities in most countries believe that vocational training is the keystone of policy for the utilisation of human resources.

¹) Introduction to the Report on the 6th French Plan for economic and social development (1971-1975).

In France, continuing vocational training has been declared "a national obligation", under the Act of 16th July, 1971(1). This Act itself follows on from those of 3rd December, 1966 and 31st December, 1968, establishing French policy as regards vocational training, social promotion and employment. These legislative measures were supplemented by an agreement signed between management and labour on 9th July, 1970 and a special rider covering executive personnel dated 30th April, 1971 which gave all employees a new right, the right to vocational training throughout their working life (Paper No. 15).

Even in the United States, where firms have a long tradition of providing basic and further training for their staffs, the Federal government itself felt the need to intervene on a matter which it considered of capital importance for economic development and social peace. The conclusions published in 1968(2) of the working party asked to study vocational training in industry are extremely interesting in this respect; the aims identified are to increase the competence and productivity of manpower, reduce and prevent shortages of skills and encourage individuals to improve their occupational ability. These conclusions have served to strengthen the whole range of vocational training and employment programmes, and led to the 1969 Manpower Development and Training Act (Paper No. 1).

In Canada, Germany, Norway and other countries, this concern is predominant. As in the United States and France, vocational training throughout working life is regarded as the means by which certain major problems common to all countries - such as making full employment compatible with the personal development of individuals - can be resolved in the context of general economic policy.

The practical measures that have been taken in Member countries are intended to meet the different needs which training during working life is intended to cater for: induction to a first job; updating and improving of knowledge and retraining for new activities.

These measures consist, on the one hand, of encouraging the establishment or extension of public or private training centres and, on the other, of enabling personnel to attend courses during working hours without any appreciable loss of pay (Paper No. 7).

1) Act for the organisation of continuing vocational training in the framework of permanent education.

2) A Government Commitment to Occupational Training in Industry, Washington D.C., Government Printing Office, 1968.

The measures taken by the authorities were introduced partly in response to the criticisms of employers who would like to see the educational system take more account of the economy's needs and reduce quantitative imbalances, for example between the excessively large number of graduates in arts and human sciences and the very small number in science, to whom an increasing amount of business responsibility is being given by big corporations (Paper No. 25), especially when having to deal with "strong" customers (Paper No. 2). Also, and even more importantly, these criticisms apply to qualitative imbalances, relating not only to the abstract character of the teaching provided, for which it is difficult to find a practical application in working life, but also to the motivations produced among the students: some think that working life often falls short of their ambitions, others expect rates of pay which are regarded as out of proportion to their effective contribution to production.

B. The improvement of personnel policies

Equally, stern criticism, however, might also be levelled at the employers (Paper No. 10).

There are still too many heads of firms who are not sufficiently aware that their personnel represents a large part of their capital and that they cannot indefinitely make the community pay for the systematic weeding-out of redundant staff, competition making it impossible to retain under-employed persons on their staff.

Staff policy must therefore answer the vital need for every employer to use and develop his personnel to the best advantage. As Mr. Turner rightly points out, the chief factor in staff utilisation is the quality of the management (Paper No. 24).

As regards recruitment, employers' faulty knowledge of the qualifications available in the labour market often causes them to choose holders of certain degrees, basically because of the prestige attached to this or that title. Others systematically recruit executive staff having the same training as they themselves or a type of training they happen to know about, without troubling to build up teams in which different, varied and complementary talents are represented. Moreover, once the recruitment contract is made, too few employers take the trouble to provide their staff with stimulating tasks calling for imagination,

initiative and creative ability¹⁾, in short their participation. They do not pay sufficient attention to the careers of their executives or to the need to train them methodically for the successive tasks they will have to carry out. In short, increasing the worth of their personnel does not yet seem to be a major concern of employers.

However, in view of the general standard of knowledge and the variety of specialisations offered by post-secondary graduates, there can be no doubt that the traditional attitude makes it impossible to make a rational choice or to lay down consistent policies for personnel utilisation. The "personnel" function in an enterprise is becoming a complex one and those responsible should be properly trained. But, as one of the Yugoslav reports points out, it is generally the function least provided for (Paper No. 10).

The study carried out in Sweden (Paper No. 18), which endeavours to ascertain how the labour market adjusts to the qualifications available, is of special interest in this respect.

As part of their staff policy, some firms earmarked substantial resources for training (Paper No. 7). But here, as elsewhere, there are big differences between firms, as is illustrated by the Italian study (Paper No. 3): the ratio of training costs to turnover ranges from 0.01 to 1.28 per cent. Staff employed by large firms thus enjoy a considerable advantage but are only a minority: even in the United States, contrary to a belief too widely held, the great majority of enterprises are small or medium-sized (Paper No. 26). The unequal treatment of employees in different enterprises has thus caused authorities in several countries to take measures to provide incentives for in-career vocational training so as to extend this advantage to all workers, whatever the enterprise that employs them. This is an important factor in a policy for the utilisation of a nation's human resources. The Spanish Group's study (Paper No. 17) is based on similar considerations.

However, training measures alone do not constitute the sum total of action likely to ensure better employment: they must be

1) The triennial study made in 1968 in the United Kingdom showed that one engineer/technologist or scientist in six was permanently carrying out technical duties of an elementary nature (Paper No. 13).

supplemented by measures to increase mobility both inside and outside the firm. This is where the most serious shortcomings are to be found in most countries.

External mobility is hindered, not only by that kind of allegiance which many employers expect to find in their personnel, but also by positive measures: regulations concerning the right to practise a given occupation, status of different types of personnel based on job classifications and taking no account of the analogy between, say, an industrial electrician and an operator of certain hospital equipment (Paper No. 26). The pension schemes peculiar to certain firms are another case in point: they are to be found even in countries where there is a national pension system covering a very large number of firms, such as the "caisse des cadres" in France. In reality it means that the employer can keep his executive staff as long as he wishes and get rid of them when he chooses, whereas some of these staff will have lost the chance of continuing their careers in another company.

A change of attitude here requires a new concept of personnel policy: the acceptance, and even the encouragement of external mobility is connected with measures for internal mobility. This is why a comparison of mobility in the United States (Paper No. 19) and Japan (Paper No. 5) is planned at the Conference.

The need for internal mobility springs from the fact that working at one job for too long is found to be harmful both to efficiency and to the morale of the job holder: after a job has been fully mastered and held for a certain length of time (5 years approximately), there follows a period of routine performance, boredom and loss of efficiency.

To be rational, a personnel policy requires a firm to have long-term ideas about its own development. Policy should be based on the concept of a career, a succession of functions performed by an individual, each function representing an opportunity to acquire proficiency in a given field. It should therefore not only ensure that an executive is not left too long in the same job but also provide for the introduction of "new blood" through the recruitment of people who have already acquired some experience outside the firm.

The improvement of personnel policy, which is an important factor for better employment of the labour force and particularly of executive personnel, is essential to social peace as well as to economic development. Measures for in-career training are an

important component and should be supplemented by the introduction of specific measures to facilitate mobility as a pre-condition for developing the ability to change. This mobility is not simply the result of training schemes: it can and should be encouraged by specific measures.

In short, staff policy should become an actual means of firms' management. Public authorities however, do not appear to have tackled this problem seriously, although there is no doubt that their intervention is necessary, as it was concerning in-career training or, in another field, when it was a question of extending social security to everyone.

C. Knowledge of, and changes in the relationships between education and employment

To be effective policies must be based on objective knowledge of the real situation. For more than a decade now there have been numerous initiatives undertaken under the general title of the planning of human resources. OECD has undertaken a whole series of studies which are described in the paper on manpower allocation and its consequences for educational policy (Document No. 8). The paper makes special mention of the problem of substitution between the various types of education.

All these studies have two essential features which explain why they could not achieve the results which were hoped for:

- they were macro-economic;
- they were in general based on inadequate statistical material.

The General Rapporteur of the Paris Conference had these two features in mind when he said that the Conference had revealed more gaps than advances in the knowledge of methods for forecasting personnel needs and had "raised more problems than it solved".

Disappointment at the results of all this work on human resources is due to the fact that, because of their macro-economic character, these studies neglected the individual, his aspirations, and his right to achieve the level of education which his aptitude would have allowed. It is the individual, however, who should have first place in the minds of all those who study the complex relationship between education and employment.

Macro-economic studies, especially when based on uncertain data, are clearly not sufficient to throw light on the problem. It is therefore essential to supplement them by micro-economic

studies if we wish to improve our knowledge of job definitions, how these change, what conditions must be fulfilled to obtain such jobs, and what possibilities for career development they offer.

The need for this new line of approach is beginning to be felt in a certain number of countries, as is evidenced by the creation in the United States of a special department for the study of manpower development problems.

Another example of an attempt to meet this same need is the setting up in France in March 1970 of the CEREQ (Centre for Study and Research into Qualifications) which does work for the ministries of Education and Labour.

Furthermore, the studies on the mechanical engineering industry in Germany (Paper No. 2) and the electronics industry in the United Kingdom (Paper No. 9) are original contributions to work on the forecasting of needs by means of a micro-economic and sociological approach in a particular sector of industry. The German study, for example, showed that the carrying out of an a posteriori forecast with the data collected, and using the macro-economic models currently employed for forecasting personnel needs, produced results which failed completely to indicate real trends in the employment of highly qualified personnel.

Moreover the data collected during this study made it possible to confirm that:

- a) the factors which determine personnel needs vary from one production process to another, that is to say, they depend on the relationship between the performance of the personnel and the product made by the firm they are working for;
- b) the total number of a particular category of personnel employed reflects not only the need but also, to an appreciable extent, the availability of this category of personnel on the labour market.

The data also showed that a distinction must be made between production departments, design offices and managerial services, because conditions in each vary enormously. In production, administration and sales, the need for technical personnel varies directly with the total number of employees in these departments while in the research and development departments the total number of technical personnel required varies in inverse ratio to the size of the runs of products produced.

These new research activities based on sampling techniques are intended on the one hand to work out a procedure for interpreting the information collected which will be appropriate for use in the field of professional qualifications and, on the other, at a later stage, to lay the foundations for obtaining objective information on the relationships between education and employment and changes in those relationships, studying employment structures firm by firm and sector by sector, the extent to which jobs are organised on a career basis and the qualification profiles of those jobs.

The first results of this research could provide interesting information on how young people should be introduced into working life and on the most glaring anomalies in the educational system.

D. New responsibilities for the educational system⁽¹⁾

This problem must be looked at primarily in the light of general tendencies to be found in the Member countries of OECD. Two of these appear to have particular importance for the new relationship between education and employment: the diversification of higher education, and the continuing and almost autonomous nature of the expansion of this sector of education.

The diversification of higher education really means that several different forms and contents of education are available at post-secondary level. From now on this level should no longer be dominated by a more or less monolithic type of university education, but should include a much wider variety of kinds of education from the point of view of length of studies (short-cycle and long-cycle courses), ways in which these studies can be followed (full-time, part-time, by correspondence, etc.), objectives and nature of courses available, (courses leading to a profession, specialised or general courses preparing for immediate entry to working life or to the continuation of studies at higher level). This variety of post-secondary education which exists to a large extent in the United Kingdom (Paper No. 13) is necessary not only because of the increasing variety of kinds of qualifications required by modern economies, but also, if not primarily, by the considerably increased variety of the student body. The vast increase in numbers has meant that there is a much greater

1) Cf. Development of Higher Education, 1950-1967, Analytical Report, OECD, 1971.

variety of scholastic and social backgrounds, aptitudes, motivations and expectations among the new entrants into post-secondary education.

To ensure that this urgently needed diversification does not produce new discontinuities and introduce new inequalities into the system, an effort must be made to co-ordinate and articulate the different kinds of post-secondary education. In practice this means the removal of the barriers between the different educational institutions, a "de-hierarchisation" of the system. It also means inter-institutional permeability and the possibility of transfer from one establishment and one kind of education to another.

The main difficulty encountered in working towards a system of this kind can best be illustrated by the problems of short-cycle higher education and its relationship with long-cycle higher education. The development of short-cycle higher education is regarded almost everywhere as an urgent necessity. However, in most countries this type of education lacks the attraction and prestige necessary for it to be developed to the desired extent. The main reason for this appears to have something to do with its historical origins. In the past, and often still today, short-cycle higher education led in most, though not in all cases, to a very definite kind of job, namely a job in the middle echelons of management. Short-cycle higher education did not allow access to higher levels of education or to the higher professions. In this sense, it was and often still is, a dead-end. However, although the labour market offers increasing opportunities for graduates of this level, or, to put it another way, although modern economies call for the expansion of short-cycle higher education courses providing occupational training, many young people avoid taking them because, as Professor Vincens has pointed out, they run the danger of being at a disadvantage compared with those who have completed long-cycle higher education(1). The remedies proposed and sometimes applied consist in assimilating short-cycle higher education to the first two or three years of long-cycle university education, thus allowing students who have completed it the choice of entry into working life or continuing their

1) "Society and its graduates": articles published in Le Monde 1st, 2nd and 3rd August, 1971, by Professor Vincens, Director, Institute for employment studies, Toulouse (France).

studies. This solution could however mean that short-cycle higher education loses its occupational-oriented character because the syllabuses are overburdened with material contained in the long-cycle courses. Graduates who had completed short-term courses would thus have an additional motive for continuing with a long-cycle course, and thus frustrate the specific aim of short-cycle education, which is to provide qualifications halfway between secondary and university level and to meet the needs of people whose interests and aptitudes are such that long-cycle higher education is unsuitable for them.

It will not be possible to overcome this difficulty so long as the present system of values prevails, so long as society puts a premium on an academic qualification, on theoretical and abstract knowledge rather than occupation-oriented education. This social phenomenon, well known in the older European countries, is also to be found in the United States (Paper No. 26). A change of attitudes towards a more flexible relationship between theoretical knowledge and practical training depends as much on employers as on the educational system.

This last conclusion brings us to another aspect of the problem - the continuous and almost autonomous nature of the expansion of post-secondary educational systems. There is plenty of evidence to confirm that this is so. It is clear, for example, that over the past 15 to 20 years, the distribution of students by branch of study has borne no relation to the presumed requirements of the economy. In general, educational systems have been noticeably resistant to any kind of measure which tended to steer their development in a particular direction. This tendency towards autonomous development, which is a common feature of all post-compulsory education, can be expected to become stronger as the system, and therefore its social and economic importance, grows and as we approach closer to our effective system of mass higher education. In such a system the relationships between education and employment cannot be the same as those which existed in the past.

As a general rule, in the "elitist" system, each level and type of education corresponded fairly closely to precise types of employment and careers. In the mass system, on the contrary, a university degree will provide access to a much wider variety of the types of jobs, that is to say, the relationships between education and employment will be much more broadly diffused.

Already this situation seems to have been reached in educational systems which are quantitatively most advanced, in particular in the United States, where personnel with higher education can be found in very varied jobs, ranging from managers of firms to secretaries and skilled workmen. Of course, this is in part simply the result of the increase in the number of people with degrees, but it also shows a changed conception of the aims of higher education, in which considerations unconnected with the job assume more importance than hitherto.

This new conception of the relationship between higher education and employment is far from being generally accepted by employers or students, especially in Europe, and this explains some of the employment problems. The reluctance of employers to engage applicants who are "over-qualified" is undoubtedly more common than the refusal to offer jobs to applicants who do not possess the qualifications normally required. For their part the students - sometimes even those who profess the most radical opinions - generally maintain that one of the basic faults of the system is that it cannot guarantee them jobs of the level and type which correspond exactly to their studies. Thus the two groups - and often the people responsible for planning and policy - consider the new higher education for the masses and its vague relationships with employment in the light of values which have been inherited from the "elitist" system. Ways of remedying this situation must be urgently studied if the trend towards the establishment of less direct relationships between education and employment is not to be accompanied by prolonged alienation and frustration of the individuals concerned, with all the social and economic consequences which this implies.

Another very precise problem arises in this respect: that of the relationship between education and certification (the award of paper qualifications). For numerous professional bodies, post-secondary education is the first and most efficient screen for access to a career. This principle is implicitly or explicitly admitted by the majority of students who in fact go on to higher education in order to obtain this passport. Almost everywhere the awarding of paper qualifications has become one of the main functions of post-secondary education. All that has been said about the new features of the relationship between education and employment - and many other considerations - throws serious doubts upon the desirability of such a situation.

The questions which arise in higher education regarding employment and the award of paper qualifications take on a new dimension with the concept of recurrent education now emerging.

In this connection the work of the Committee which has been operating in Norway for some years now (Paper No. 16) deserves careful consideration.

This Committee, set up to study post-secondary education, has tried to examine everything which could be covered by the notion of recurrent education. It rejected the narrow definition of the term, which limits recurrent education to the task of adapting qualifications to the new requirements of the economy, and extended it to cover such aims as the development of the personality to allow the individual to play an active role in the community and to participate in decisions involving reassessments of social values.

The Committee insisted from the outset as a matter of principle that it was not appropriate to establish a rigid distinction between recurrent education which was necessary for individual development and that designed to meet vocational needs.

Moreover, the Committee took the view that the whole population should benefit from this education. In other words, the Committee gave to the notion of recurrent education the meaning which certain other countries had given to the concept of "continuing education".

However, and in spite of the intentions of the Committee, Mr. Dalin echoes an opinion widely expressed in Norway at the time when this report, and also one on training in industry were published. He writes "people are afraid that most of the participants in recurrent education will use it to improve their professional specialisation at the expense of the broader aims proposed by the Committee".

Moreover, these broader aims were criticized by the association of highly skilled workers and other sectors of public opinion, who wished to see the separation of the cultural from the vocational aspects of continuing education.

It is interesting to note that very similar discussions took place in the French Parliament last June when the Bill on vocational training was being examined.

As a result the text finally voted was given the title: "Act for the re-organisation of vocational training as part of continuing education" (Paper No. 15).

In practice, the responsibility of the educational system is thus to a great extent concentrated on vocational education.

If in addition to its cultural responsibilities the educational system is going to have to meet increasing demands for in-career training, it is no wonder that at the present time in many countries it is unable to satisfy all the needs.

However, in vocational training the educational authorities are not alone in having to face up to these needs, hence the need for continuing co-operation with the other parties concerned with this training.

E. Co-ordination of activities

As was mentioned above, education, employment and industry have traditionally developed without any organic link between those responsible for the policies applied in these various fields. The need for co-ordination, although clearly apparent, still encounters serious difficulties. In France it has been the subject of measures of an institutional nature the implementation of which will be interesting to follow.

The barriers which have long existed between the education authorities and those responsible for employment are not easy to overcome. Dean Wolfbein, speaking of the American Manpower Development and Training Act of 1969 (Paper No. 1), notes a very revealing consequence of these barriers. The new Act which is intended to bring under one management all the government departments concerned with manpower, leaves the individual states of the United States entirely free to include or not the departments responsible for education and vocational training questions. An amendment moved by a member of Congress to make this inclusion compulsory has still not been approved.

But the idea of merging in a single administration problems concerning education, science, employment and social affairs seems not to have been abandoned. A bill creating a single ministry for education and manpower has been laid before the American Congress. Its preamble deserves special attention (Paper No. 1).

In France (Paper No. 15) substantial progress has been made in recent years towards co-ordination. A National Council for Vocational Training, Social Promotion and Employment has existed since 1967. It is presided over by the Prime Minister and includes all the ministers concerned with the question (Education, Labour,

Industry, Agriculture, Finance, etc.) and representatives of employers and workers. Its Secretariat is provided by the Prime Minister's Office.

In Canada where there is no Minister of Education at Federal level, the Ministry of Manpower and Immigration, which was set up in 1966, now combines under the same authority policy for training and employment (Paper No. 12).

However, the individual characteristics of each province continue to leave their imprint on training problems.

The need for measures of an institutional character to co-ordinate education and employment policies is also beginning to be felt in other countries, but the measures taken up to now are of a temporary and sometimes partial character.

Thus, in the United Kingdom, the Ministry of Labour has been made responsible for co-ordination under the Industrial Training Act of 12th March, 1964. The Central Training Council which advises the Minister draws its members from all interested parties - the public authorities (education and employment) and employers' and trade union representatives (Paper No. 13).

In Italy, Germany and Spain special groups, made up of representatives of all the interested parties, were set up after the Paris Conference of 1966 to make preparations in those countries for participation in the present Conference.

One of these groups, the Italian Commission, has been particularly active. It submitted an important report to the Ministry of Public Instruction proposing a certain number of reforms which the Commission had studied in depth (Paper No. 4). Moreover, under the auspices of this same Commission, a survey was made on in-cases training for managers of Italian firms employing more than 500 workers (Paper No. 3).

Under the auspices of the German group a survey was planned and carried out on the utilisation of technical personnel in the German mechanical engineering industry (Paper No. 2). Studies were also made on the need for and growing employment of highly qualified personnel (Paper No. 14).

The Spanish group carried out a study of the needs for in-career training in the scientific and technical field. The results will be used by the public authorities in the context of the reform of education which was decided a short time ago (Paper No. 17).

However, none of the groups referred to above has given rise to the setting up of a permanent body responsible for co-ordination between the authorities responsible for training and for employment. But the fact that the groups exist is proof of significant progress and an indication of the awareness of the need for co-ordination - co-ordination to which the Venice Conference could give a new impetus.

GENERAL CONCLUSIONS

The above analysis of the main issues arising in the papers submitted to the Conference suggests the following conclusions.

Changes in the tie-up between education and employment

Whereas at the Paris Conference the main preoccupation was how to adjust an expanding educational output to employment opportunities by the application of such techniques as manpower forecasting, clearly the point of departure today must be that the establishment of a better relationship between educational development and the labour market requires major structural and qualitative changes in the educational system itself.

Jobs in industry must offer those who engage in them broad opportunities for individual development and advancement in their careers. Industry and society in general must take a larger part in defining the objectives of education, and educationalists must themselves be more responsive to developments in the world outside.

The development of mass education in advanced industrial societies has led to the abandonment of the view that education is simply the supplier of a stock of qualified people for industry. New relationships between education and employment must be developed if present quantitative and qualitative imbalances are not to increase.

Career development

One consequence of the changed situation is the rapid disappearance of the notion that a particular occupation is the object of specific training. The implication of this is twofold:

- a) that industry must be able to offer individuals wider opportunities for adjusting to new jobs as they arise and for developing their personal aptitudes;
- b) that those responsible for the economy become partners of those responsible for education in the organisation of training as part of career development.

Training activities play an important but not exclusive role in career development. They must be supplemented by measures to facilitate mobility both within and outside the enterprise. In most countries it is precisely in this respect that the most serious shortcomings are to be found.

Knowledge of the relationship between education and employment

Studies made so far show that the macro-economic approach by itself is not enough to provide adequate knowledge about jobs in industry, the way they are changing, conditions for access to certain jobs, and career development. It must be supplemented by micro-economic studies using sociological and psychological methods and carried out at sectional, enterprise and job levels.

New educational structures

The situation described above leads to a new concept of post-compulsory education, that is to say, the relationship between the later years of secondary education, vocational training and higher education in general.

The needs of society and the aspirations of individuals are now such that more diversified structures of higher education, of which the universities are an important part but by no means the totality, need to be developed.

The design and operation of such post-secondary structures imply close co-operation between the educational authorities and the employers.

An important element in such structures should be the development of short-cycle higher education in various forms, including courses more closely related to the needs of the labour market, if the massive expansion of higher education in Member countries is to lead to a reasonable adjustment between social needs and the aspirations of individuals.

The importance of these changes leading to new relationships between the educational system, the employer and the individual

is such that it now seems possible to work towards a new concept of the educational structure, namely "recurrent education". The essential principle involved is that equality of access to education should not be conceived of solely in terms of opportunities for higher education immediately following secondary school, but also in terms of renewed opportunities for additional and more advanced education for the individual over the course of his or her working life. Such a policy could be effective only if buttressed by a constructive attitude on the part of employers to the development of their employees and by educational structures operated jointly by those responsible for education and the economy.

A general revision of educational policy of this type requires that there be no opposition between practical and theoretical training. A major change in this direction implies that secondary education increasingly recognises that education in its broadest sense implies a knowledge of and an involvement in practical affairs which cannot be provided if the school is isolated from society. If the school of the future is to prepare young people more efficiently for the realities of life and help them enter the labour force, then closer links must be set up between education, economic activities and society in general.

II

DISCUSSION PAPER "A" EMPLOYMENT PROSPECTS IN THE 1970s

I. INTRODUCTION

The discussion is intended to show the evolution in the nature of employment questions and to bring out the main questions which will arise for policy-makers in the 1970s.

Basic report "Employment Prospects in the 1970s" contains a study of the trend of employment in Member countries, centred mainly on questions affecting highly qualified personnel⁽¹⁾. An attempt has been made to bring out the main trends and to show the conflicts to which they may lead or have already led.

1. The factors of change in employment conditions

The new industrial society is the resultant of a number of factors which may be grouped as follows:

a) Industrialisation and the application of technical progress have led to a transformation of production and distribution methods in all sectors. This transformation, which still originates mainly from the demand for goods and services has called for a radical change in occupational patterns. Although industrialisation is not equally advanced in all countries, the economic and political role of highly qualified personnel is evolving everywhere.

b) The modern economy is an economy of change linked to the evolution of demand and keener international competition. This evolution affects the balance between sectors of the economy, the occupational pattern and the demand for skills. It is reflected in a constant need for adaptation.

c) The development of education brings to the labour market young people with a much more thorough education, but who have

1) The term "highly qualified personnel" should not be given too strict a definition which might be unacceptable to all countries. It includes managers, engineers and technicians, the professions, etc., defined in the light of their functions rather than of their degree or diploma qualifications.

been sheltered from the exigencies of working life by longer schooling.

There is already found to be a divergence, especially at university level, between the orientation of and social demand for education on the one hand and the demands of employment and of economic development on the other. This divergence manifests itself both in the qualifications and in the motives of graduates.

2. Fundamental problems

These factors will bring about radical changes in the conditions of employment and perhaps even in the objectives of society. Certain concerns are already emerging in the most advanced countries.

a) The pursuit of expansion and the use made of qualifications

The pursuit of expansion and the growing complexity of productive organisation call for the constant adaptation of individuals. But the improvement in their living conditions, in their whole training itself, does not always incline them to bow to more powerful material and intellectual restraints and there is some fear that this may be a factor in slowing down economic and social development.

The first aim of the Conference is to study what measures are calculated to improve the use made of available qualifications, and to create conditions more favourable to occupational development.

b) Full employment and personal development

Consideration of the state of affairs in the different countries discloses the existence of unemployment among certain categories of qualified personnel. But for executives and managers full employment means something more than the absence of unemployment; it also means the utilisation of their qualifications and their abilities, the possibility of a progressive career and of developing their personality.

Do the existing inflexibility of structures, and present practices in the matter of employment and training make it possible to meet these requirements? What evolution would be desirable? How far would this evolution be consistent with the requirements of expansion contemplated under (a) above?

c) The function of education

The function of education can be looked at from two angles:

- What has been the past role of initial education in the creation of qualifications?
What will be its future responsibility in the pursuit of the two foregoing objectives?
Does not the new industrial society demand some evolution and adaptation of initial education?
- How far is education in the course of the career contributing today to the development and adaptation of qualifications? What will be its role in improving productivity and preventing imbalances in occupational and personal development?

There is a tendency today to group these two aspects together under the heading of continuous or recurrent education. This idea is not very relevant to the discussion of the problems raised and could be taken up again on the third day's discussions.

II. DISCUSSION POINTS

Consideration of the trend of occupational patterns and the practical experience of certain Member countries indicates the shift of employment problems to the most highly qualified personnel, hitherto sheltered from economic fluctuations.

This shift is accompanied by a change in the nature of employment problems, in which qualitative factors are assuming growing importance.

In the basic report an attempt has been made to show how activities have evolved and to forecast, so far as possible, the likely trend in the next ten years, and, at the same time, who are the men who will be needed to carry on these activities.

The comparison of these two components of our political and social future leads to consideration of the following points.

1. The supply of and demand for qualifications

In many Member countries there is already a lack of balance between the demand for qualifications and their supply, and this lack of balance may be expected to continue throughout the 1970s, insofar as its causes are not purely cyclical.

a) Unemployment among young graduates

Is it possible to identify the categories of graduates who experience employment difficulties, and to explain their situation quantitatively or qualitatively? Can the cyclical factors be separated from the structural causes?

b) Mid-career unemployment

This feature differs in magnitude and character among the different Member countries; it is interesting to look into the causes. Is it possible, for example, to distinguish between people whose unemployment is due to career and employment conditions and those who are out of work because of a sudden economic mutation?

c) Specific shortages

Shortages of specific categories of personnel have been identified in several countries. Without going into the shortages of labourers and skilled workers experienced by most Member countries, reference may be made to the shortages of qualified technicians in several countries which constitute a serious brake on expansion. Have the social and economic causes been diagnosed and are they expected to die down in future?

2. The use made of available qualifications

The imbalance between the demand for qualifications and the supply raises the question whether existing training and employment policies and practices create the conditions for a sound use of available qualifications and whether they can be continued in the future.

a) Do existing employment conditions - the structure, organisation and functioning of the market, training facilities, mobility - allow supply to be permanently matched with demand? Or can the obstacles to this adjustment be identified? From a dynamic point of view how far can the concept of a career be linked with these adjustments?

b) Is not the organisation of employment, even if incapable on its own of remedying pre-existing divergences, itself a cause of disequilibrium? Is it possible to identify ways and means of preventing this disequilibrium, or should one contemplate a re-appraisal of accepted ideas in the matter of careers, mobility and supplementary training?

c) Does the organisation of employment allow - and, above all, will it allow in future - personnel already in employment to advance in their careers and to give of their best in their working life?

3. The role of education

The education system has developed over the last decade in the light of social demand without reference to the trend of the needs of the economy and the possibilities of employment. At the moment, when the generations which have benefited from the expansion of education are coming onto the labour market, it may be asked what role education plays in vocational preparation and the acquisition of qualifications.

A study made in France has shown that the contribution of education has so far been very modest and that in industry, in particular, nearly half the qualifications have been acquired by experience and personal work.

a) In the light of longer schooling, is the present orientation of education favourable to improved vocational preparation? (Both from the economic point of view of the suitability of the training received and from the social point of view of enabling everyone to find and keep a job.)

b) What has been the particular role of supplementary training institutions? (Institutions catering for school leavers and those for the further training of executives could be considered separately.)

III. CONCLUSION

Consideration of economic trends and employment forecasts shows that, for economic, social and political reasons, governments, management and labour must make a number of adjustments, which can be grouped as follows:

a) A long-term policy mainly consisting of the re-orientation of education;

b) A medium and short-term policy designed to improve the utilisation of highly qualified personnel by measures relating to careers and supplementary training.

The second day's discussions are intended to study in depth the nature of the problems of utilisation; the orientation of

education will be taken up again in plenary session on the third day. Opinions on the following points should be debated:

- The need for a better knowledge of the functions and qualifications of highly qualified personnel and of the functioning of the relevant labour market;
- The need to adjust personnel policies and career patterns in the light of the economic trend and of greater flexibility in the matter of mobility;
- The definition of the role and responsibility of the State in the functioning of the labour market for qualified personnel;
- The need to develop, co-ordinate and control the various initiatives in the matter of in-career training;
- The enlarged responsibility of education for vocational preparation and the development of qualifications;
- The bringing closer of the authorities responsible for education and for employment, not only by the creation and control of ad hoc arrangements, but also at the level of defining objectives and formulating policies.

DISCUSSION PAPER "B"
(GROUP I)
CAREER DEVELOPMENT AND MOBILITY

I. INTRODUCTION

Career development and mobility, like supplementary training, may afford a permanent means of adjustment to the needs of the economy. The basic report "Employment Prospects in the 1970s" shows how mobility may also be a means of stimulating economic development and preventing certain social tensions.

The aim of the discussion is to consider how far accepted ideas about careers and mobility really allow a sound use to be made of available qualifications and how far it is imperative to revise these ideas in the 1970s under the pressure of new employment conditions.

1. The concept of a career

The concept of a career may be defined mathematically as the sequence of events affecting the functions or job of the individual. In practice, however, the concept of a career is linked with the idea of promotion in the hierarchy, increased responsibilities and higher income. In practice, too, with some exceptions, the idea of a career really applies only to highly qualified personnel, and particularly to graduates.

What are the forces which have helped to form this idea of a career?

- The need to fill management posts by internal recruitment from among people with the necessary qualifications and experience; this need was no doubt first felt in the public service and then in big business, which is hierarchically organised on much the same lines;

- The concept of a career was reinforced by the development of industries and the growing need for qualified personnel, leading to the creation within the firm of qualifications not to be found on the labour market or insufficiently provided by the education system; in this way the benefit of a career has been extended to other categories of personnel of a more modest social or school origin;

- The desire of workers, particularly the less well paid workers for a better paid job and their ambition to acquire higher social status by taking advantage of greater experience or higher qualifications.

The combination of these factors has so far allowed a certain adjustment to the requirements of economic progress, an adjustment which in practice has meant a general rise in the level of qualifications rather than any adjustment or redistribution of these qualifications among sectors. These forces have so far worked together; are they not now, on the contrary, likely to become a source of tensions and conflicts?

2. The new conditions of employment

Consideration of employment prospects for the 1970s in fact indicates the emergence of a new situation, especially in the most developed countries. The new employment conditions have an impact on individual career patterns.

- The transition from an expanding economy to an economy of change will afford greater incentive to adaptation and specialisation, and even to change, than to promotion and rising in the hierarchy. This change will call for greater mobility than in the past.

- The inflow of young graduates, usually recruited at a certain level in the hierarchy, will start by creating competition with personnel already employed, the first effect of which will no doubt be to block the advancement of workers of a more modest school origin. Later, these young graduates, who are looking for a career pattern similar to that of their predecessors, will be in keen competition with each other for responsible jobs.

- It is worth stressing certain factors which tend to ensure the permanence and even the extension of the present career system. They are primarily the evolution in the respective roles of capital and labour, and which gives increasing power to qualified personnel, and the development of social legislation enshrining accepted ideas and principles and even extending their benefit to increasingly wide categories of personnel.

3. Questions raised

The juxtaposition of these factors raises the question as to whether present career and mobility policies can be continued in future. In particular, the following questions arise:

- Should not the whole conception of mobility in the minds of management and labour be radically changed, not only to allow for the varying fortunes of firms and sectors, but also to prevent the formation of artificial equilibrium which amounts to a misuse of skills and aptitudes?

- Will the changes in occupational patterns and the narrowing difference in standards of education afford everyone the opportunities of a progressive career and in what form?

- Will not the new employment conditions thereby lead to a change in the links between the firm and its personnel? What might be the economic and social consequences of this change?

- What might be the role of supplementary training⁽¹⁾ in career development? Is it a question of meeting a need to adjust to the specific functions of the job or of undertaking a more general policy of developing qualifications?

1) This question will be considered by Working Party II.

- How far are in-career training and mobility complementary in the search for adaptation to economic needs and a better use of skills.

II. DISCUSSION POINTS

As a step towards answering the policy questions just raised, it is proposed that the following specific points should be considered and discussed.

1. Present practices and policy in the matter of mobility(1)

Up to now, in most OECD Member countries, there has been little mobility of highly qualified personnel and in practice it has been the general rule, after some changes of job in the early years of working life, to spend the whole of one's career with the same firm or the same employer; in Japan there is even a tradition of life-long employment.

The question arises today in Japan whether present policies make it possible to keep pace with economic evolution. It is interesting to compare such different practices as those of Japan and the United States to establish the need for a reform in personnel policies.

a) In constantly expanding sectors of industry, have new needs for qualifications been met solely by internal promotion and the recruitment of young graduates or has the labour market been called upon?

b) Is it possible to specify the type of qualifications for which there is an increased need owing to the expansion of the sector (e.g. design engineers)?

Can this type of qualification be linked to a specific source of recruitment?

c) Is the nature of the needs expected to remain identical in the 1970s?

In particular is the inflow of young graduates expected to meet them?

The first group of questions is designed to establish whether, within a steadily expanding sector, and therefore regardless of the mathematical consequences of the differential

1) Without desiring to give this word a too limited definition, it may be taken here to mean changing firm or employer.

development of sectors, mobility is and/or will be regarded as a necessity arising from specific qualitative needs and, in particular, from the insufficiency of the flow of graduates to meet the needs of expansion.

One might also inquire into the reasons which have so far induced employers to retain their staff and have made them reluctant to recruit executives from outside.

d) What are the arguments which determine the present attitude of employers towards mobility?

Can we assess the value which these arguments will have in the economy of the 1970s?

e) Can we, in particular, assess the importance of "knowledge of the trade" in the makeup of the present attitude?

Can its components be identified, with a view to prospective analysis?

How far would stricter organisation and greater functional specialisation lessen its weight in the assessing of a qualification?

f) What means are used to keep executives in the firm and encourage them to finish their career there?

When and why were these means adopted?

g) What are the main reasons why employers do not go on to the labour market?

How high is the cost of recruiting?

What part does salary play in their assessment?

What part does the quality of information play?

2. The functioning of the labour market

The functioning of the labour market is an obvious condition of the use of available qualifications; it becomes paramount in the case of executives and managers whose qualifications and experience are much harder to ascertain and describe than those of workers. Possibly more adaptable, they need a much higher quality of information.

a) What is the respective role and share of the various existing means of information, selection and recruitment?

Can a "specialisation" be identified for each of them, and what are the causes?

b) What is the particular role of public employment services?

Are there public or joint services⁽¹⁾ concerned solely with the market for highly qualified personnel?

What is their present role?

What are their ambitions for the next ten years?

c) Is it possible to arrive at an assessment of the functioning of the labour market on the basis of the answers to (a) and (b)?

Is the market entirely covered?

Can any limitations or partitioning be identified?

Are there career channels?

How far are these channels justified?

3. Imbalances arising out of the changes in occupational structures and career patterns

Present practices in the matter of careers and mobility and the functioning of the labour market lead to disequilibrium. Some categories of personnel, though capable of making a contribution through their work, find themselves shut out of the system; others are under-employed. They are mainly young graduates who have not had an appropriate training and executives in mid-career.

Difficulties have emerged in several countries in the employment of experienced executives; there is reason to think that these difficulties - like those of young graduates - have causes which are not purely cyclical, and that they are likely to get worse in the next ten years.

These employment difficulties seem to affect two types of people: top specialists - such as United States engineers and scientists - thrown on to the market by the re-orientation of a major national programme, and high level staff who have lost their skills in stagnating sectors affected by technical evolution and the play of competition. Perhaps, also, these two categories are merely two aspects of the same problem, and the corresponding unemployment similar in nature.

a) Can we identify the people affected by unemployment and specify the circumstances which have caused them to lose their jobs?

b) Apart from immediate causes, is it possible to identify the root causes of this state of affairs?

1) Such as the "Association pour l'emploi des cadres" in France.

Are there any mechanisms which bring about an elimination or does this phenomenon just happen to affect qualified personnel?

c) If we now look, not at the reasons why these people have lost their jobs, but why they have difficulty in finding alternative employment, can we specify the reasons why potential employers rule them out?

Does this inquiry in itself indicate the basis for a policy or re-integration and vocational re-training?

d) Can we, on the basis of the answers to the previous question, specify the causes of unemployment - and more generally of under-employment - connected with the present conception of a career and the insufficient mobility of highly qualified personnel?

III. CONCLUSIONS

The search for increased productivity and the concern with full employment leads to the desire for greater mobility and more flexibility in the development of careers. It is hoped that the Conference may be able to reach specific conclusions in the following fields:

The personnel policy of employers

These policies are at present changing as a result of the growing numbers and importance of qualified executives in the firm. This change should normally take account of three requirements:

- The need to give this personnel an interest in the running of the firm and in the results of their work.
- The need to maintain the level of qualification of the personnel and in particular to keep it in relation with the salaries and other income they earn.
- The need for forecast management which takes account not only of the development of the firm, but also of overall forecasts in the matter of qualifications.

Social policies

These are the policies or attitudes of management and labour towards income, social advantages, retirement schemes, etc. Up to now they have been conceived in the limited context of the "profession" and very often constitute a bar to mobility.

The functioning of the labour market

The functioning of the labour market has perhaps not yet been the subject of all the attention desirable, insofar as it affects qualified personnel. The following seem to be desirable:

- A better knowledge of functions and qualifications.
- A better appreciation of the different means of recruitment and selection.
- The definition and implementation of a government policy, especially for public or joint placement services.
- The assessment of needs for mid-career training, which forms the subject of the work of Working Party II.

DISCUSSION PAPER "C"

(GROUP II)

FURTHER EDUCATION AND TRAINING OF HIGHLY QUALIFIED PERSONNEL

I. INTRODUCTION

The basic report "Further Education and Training of Highly Qualified Personnel" provides an analysis and a re-statement of the fundamental problems of further education and training as they emerge from a preliminary investigation of the utilisation of highly qualified personnel in most industrialised countries. Utilisation will be analysed by defining the circumstances under which the content of the work society offers can be made to tally with the aspirations of the worker.

In the present state of the educational system and the labour market contradictions are developing at a rate which calls, often urgently, for solutions. These contradictions are due at first sight to conflicting tendencies in modern society. On the one hand the urge to achieve a higher standard of living for the community as a whole demands optimum productivity from the economy which is required to provide the services desired and supply the resources necessary. On the other hand the demographic and social trend reflected in the greater expectation of life, the reduction in working life, the increase in the time reserved

for rest and leisure and the urge for culture and education is to reduce or delay the workers' participation in active life. Moreover, the differences in the rate of change in education and the economy have led to the paradox of under-qualification in certain sectors of industry and over-education in others.

As part of the search for effective long-term solutions a number of formulas designed to harmonize the moral and material objectives of society are now being considered. The problems involved will call for considerable thought. One of the formulas proposed is what is known as recurrent education which would intersperse periods of activity with periods devoted to the acquisition of knowledge in order to provide workers with the necessary qualifications when the need for such qualifications arises(1).

The problems of further education and training considered at the present Conference do not aim so high. In view of the present state of the educational and economic systems the objective is to define a number of remedies for the contradictions, both human and economic, which exist at the present juncture and will also arise in the next decade in connection with the utilisation of highly qualified personnel.

For the analysis of the problems at issue the present document draws its readers' attention to the basic report but proposes, in preparation for the discussions of Group II, to identify the major concrete cases observable in the OECD countries in order to consider what action might be taken to solve them. The discussion on these concrete cases might be considered from three aspects which are fundamental for the achievement of effective solutions, i.e. the scale of the requirements, the role of the different socio-economic forces and the allocation of costs, and the effect on structures i.e., the organisation of continued training structures and the repercussions on the pattern of formal education.

As far as utilisation is concerned it would seem there is to be no specific discussion on a number of other problems which cannot be ignored and should even be emphasized in view of their importance. These include teaching methods and specific arrangements relating to the situation in particular sectors or regions.

1) See in particular: Recurrent Education, OECD/CERI, Paris (to be published).

It might be a useful approach to the three major aspects suggested for the discussion to consider the different levels at which the solutions will be devised, applied and structured. For this reason further training may be viewed as an instrument in the policy of individual firms and an instrument in a national policy of adaptation and progress, it being borne in mind that continued education and training is intended for the benefit of the individual.

II. CIRCUMSTANCES REQUIRING CONTINUED TRAINING PROJECTS

As subjects for discussion Group II might adopt four concrete cases which are particularly representative of the present and future objectives of further education and training schemes:

- induction of young graduates into their first job and arrangements to maintain, improve and up-date their knowledge.
- absorption of young unemployed graduates.
- conversion of qualified personnel who are unemployed or under-utilised.
- social up-grading and development of qualifications.

1. Induction of young graduates into their first job and arrangements to maintain, improve and up-date their knowledge

The action taken to achieve these objectives is designed to promote occupational efficiency. Experience shows that young graduates recruited for industrial posts are rarely able to exercise a function at the outset without a practical initiation. Young engineers, barristers, bank personnel, doctors and others all serve a practical period of initial adaptation. Later, in the course of their careers, they feel the need for readaptation in cases where previous techniques have been superseded, methods have changed, obsolescence is beginning to set in and the course of their careers makes it necessary for them to cope with new functions.

In the modern world, these needs are constantly increasing. The expansion in education has had a mass effect which makes more general and more uniform the basic education. Furthermore, the acceleration of economic and technical progress, the raising of the school-leaving age and the growing consciousness among organised labour and the community as a whole that everyone has

his chance and his right to self-fulfilment have intensified the need for improvement and up-dating of knowledge.

Requirements under this heading seem at first sight to be primarily specific, i.e. they generally arise in connection with the exercise of one function or one specific task. However, they take on a general character, first owing to their frequency and secondly owing to the importance to the community of an upward productivity trend and a steady improvement in the knowledge of the workers.

It will be observed that initiative in respect of this type of requirement has hitherto generally been taken by individual enterprises, particularly large-scale firms. This is no doubt due primarily to the fact that the latter have an immediate interest in securing the best possible return on the functions they pay for. But it may be wondered whether this factor is not the sign of a far-reaching evolution. Is not the increase in the size of enterprises likely to give them an almost absolute control over certain sectors of the market, including the employment market? Secondly, is not the growing tendency of large-scale enterprises to concentrate on the recruiting of young graduates and subsequently train the latter themselves likely to undermine the personality of these employees and even reduce them to a servile state? Is this situation not bound to bring about a disparity in the actual level of the qualifications of personnel in big industrial enterprises and workers in other branches of the economy, e.g. the craft sectors, the services, education, research, public administration and the self-employed professions?

Professional efficiency, which is one of the main interests not only of a firm but also of the individual worker who requires security of tenure and a progressive career, must therefore be considered as an element in enhancing social productivity. Would it not therefore be expedient for the State to stimulate schemes in this field owing to their repercussions on the progress of the community? Might not this collectivisation of needs take the following forms:

a) Relieving the individual of the cost of the additional education and training which is prescribed for him or which he is anxious to obtain?

b) Financing training schemes by a uniform rate of contributions from industrial or commercial firms and public

undertakings, calculated, for example, as a proportion of their turnover or their work force?

c) Encouraging individual firms by offering tax reliefs proportionate to the hours of work sacrificed?

d) The provision by the public authorities of the necessary infrastructure, i.e. school premises and teaching equipment?

e) Organising the system so as to extend the use of facilities for further training to workers employed in all sectors of the economy, services, public administration and independent professions and considering what forms it should take in these cases?

2. Absorption of young unemployed graduates

The projects undertaken in this connection are part of the conversion action necessitated by the general economic and social trend. In many countries a disquieting situation has arisen which it may be feared will develop in the course of the coming decade. In certain countries the statistics of young graduates registered as unemployed show that over 4 per cent are jobless for about six months after their graduation(1). This proportion exceeds the limit of unemployment generally accepted as tolerable and is, in any event, a new phenomenon as far as graduates are concerned.

This situation is probably due to structural rather than cyclical causes. Education has been expanding, students have been free to choose their field of study and the rise in living standards has attracted an increasing number of young people towards high-status jobs carrying substantial salaries. These rapid new developments have produced a pattern of qualifications which is no longer consistent with modern economies.

Whether this discrepancy is explained by the absence of educational guidance or the failure of the economy to keep pace with social trends, it is a fact that the developed societies are confronted with a growing problem of unemployment among young people. Whether the latter have not completed their studies or have acquired qualifications which are now a glut on the labour market or which have become obsolescent, they are faced with a more or less prolonged period of unemployment, and, in most cases,

1) See Table 9 of Basic Report "Further Education and Training of Highly Qualified Personnel".

finally take up jobs which are consistent neither with their education and training nor their aspirations.

This is a nation-wide problem like all the other conversion problems and an attempt may be made at this level to devise ways and means of meeting it.

a) Should not positive action be taken by the public authorities to promote occupational mobility among young unemployed graduates?

b) Does not occupational mobility call for prior action by the public authorities to detect sectors or functions where economic expansion and an increased demand for labour are likely to afford these young people employment?

c) Should not liaison units be set up in universities for research on careers involving the participation of students in the preparation of curricula and in arrangements for placement and for practical training periods?

d) Should not the further training to be given to young unemployed graduates be of a directly vocational nature?

e) Should not this training be directly determined by a number of recommendable trends?

f) Have not the further education and training schemes in this field to be directly organised by the State and should not the latter subsidise private initiative?

g) Should schemes be subsidised in the form of:

- an allowance to be paid to unemployed persons for further education and training?
- or access free of charge to education and training courses, which would imply that the latter were directly run by the State or that private schemes were eligible for a system of subsidies?

3. Conversion of qualified personnel who are unemployed or under-utilised

Unemployment among qualified personnel, which is to some extent similar to the previous case, seems also to be entirely a matter for conversion schemes as it arises from trends which are outside the field of personal decisions. It is possible that unemployment among qualified personnel in the course of their career is at present less obtrusive than unemployment among young graduates but it sometimes has tragic overtones in the case of qualified personnel who are in older age groups or

who, whatever their age, have lost their employment as a result of the disappearance of a particular regional or sectoral activity or other trends which are generally due to structural causes. Even if it is clear that current economic trends may have a certain effect on the unemployment of highly qualified personnel, particularly young graduates, it must be realised that the conversion of those personnel whose qualifications are far from being as rapidly interchangeable as those of unskilled labour or personnel engaged on routine jobs cannot be successful unless it is consistent with structural trends. In the case of under-employment the persons affected feel themselves unable to make adequate use of their knowledge and proficiency, while their employers feel that they are not obtaining an adequate return from the qualifications they are paying for.

As the unemployed graduate ceases to be the responsibility of an employer but depends for his material subsistence on a collective insurance system, it seems indisputable that his conversion should be a matter for the public authorities. Apart from any vacancies which may be offered to him by the labour exchange it seems to be an accepted principle that the additional training needed for his conversion should be organised or financed by the authorities. It might perhaps be argued at first sight that the case of employees who consider themselves under-utilised is part of the problem of social up-grading (see below) and is a matter solely for the individuals concerned. Nevertheless, in a socially motivated community pursuing an active manpower policy it seems desirable that the State should stimulate individual decisions and intervene to some extent, if not entirely, in conversion projects of this kind.

Could not intervention by the public authorities in these cases take the form of:

- a) An allowance for further training to be provided in addition to unemployment relief?
- b) The introduction of an information and guidance service for unemployed persons seeking conversion?
- c) The establishment of a supplementary training infrastructure in localities where sizeable pockets of unemployment exist and the payment of a lodging and travelling allowance to unemployed persons outside these pockets?
- d) The payment of the cost of additional training courses chosen by qualified personnel who are not unemployed but wish to convert and can show proof that they are attending a course?

4. Social upgrading and development of qualifications

Historically, the first additional training schemes were designed to promote social upgrading and have continued to be extremely important in many countries which have long had organised occupational training systems for adults. These schemes have generally been organised by the public authorities but have often been assisted by industry. They are intended to give an additional training to workers with little or no qualifications and enable them to exercise functions requiring higher qualifications. The selection of personnel for upgrading used often to be carried out at firm level, the number of dropouts was considerable during the courses, which were often conducted under rather arduous conditions, generally after working hours or in leisure time.

Courses of this kind are similar to schemes to promote professional efficiency and in-plant advancement but largely also apply to individuals who are anxious to change their occupation and employer. The concurrence of the motivations behind these education and training schemes, which concern not only a country's general productivity but also its social policy, seems to justify the introduction of permanent facilities by the public authorities. This step involves a certain number of problems:

a) Would it be expedient to institute full-time or part-time educational leave and what procedure should be adopted for this leave not only to meet the wishes of those who are anxious to take advantage of up-grading schemes but also to avoid disorganising production and cope with material and moral frustration in case of failure?

b) Which is the best way of financing: either a State subsidy paid to the beneficiary or the establishment of an inter-industrial equalisation fund, or both?

c) What arrangements could be made for self-employed persons?

d) Has not systematic information to be circulated to all categories of workers likely to be interested?

e) How to organise the re-allocation of responsibilities at firm level to offset the loss to the employer arising from educational leave?

f) Should not consideration be given not only to occupational training but also to cultural and personal needs in a socially motivated modern community?

III. THE STRUCTURING OF TRAINING SCHEMES

An examination of the various categories of schemes which are listed above seems to show that interests, motivations and procedures frequently coincide. Government schemes to enhance the general level of qualifications are fundamentally of the same nature as those which are conducted by individual firms to maintain, upgrade, supplement or renew the qualifications of their personnel. As these schemes are frequently conducive to the social upgrading of the individual, any initial distinction between economic and social motives seems to have little practical significance. In these circumstances, the situation seems to call for joint action to make the most effective use of the available resources and avoid wastage and duplication.

The realisation of this joint task raises the problem of the repercussions of a generalised system of further in-career education and training on basic education and training. There seem to be conflicting views on this matter at the present time:

- Certain observers consider that specific training should be provided when it is necessary for the exercise of a profession and that basic education and training should therefore be of a general nature; other planners feel that vocational specialisation should begin at school and that subsequent training should provide additional or new knowledge when the need arises.
- The first case involves a risk of flooding the labour market with workers who are unusable because they have no specific vocational training; in the second case the acquisition at school of a skill which is too specific could act as a brake on vocational mobility and in certain instances could obstruct access to the labour market.
- There may be divergent views also on the respective costs of vocational training after workers have begun their active career or of schemes to induct, improve or convert both employed and unemployed workers.

In view of these divergencies certain planners favour an intermediate solution which would give pupils in the educational system a basic education sufficiently wide to meet the need for occupational mobility whenever it arises in the course of a working life, while arranging for adequate technical education in a range of pre-determined sectors with a special vocational training at the end of the school course.

Could the joint action by the State, the educational system, individual firms, socio-professional associations and regional development organisations etc. be combined as follows:

- a) Pooling of available intellectual resources (teachers, instructors) and available material resources (premises, laboratories, teaching equipment)?
- b) Organisation of a realistic system of educational leave to enable all workers who so desire to participate in systems of recurrent education and training or to obtain a second chance?
- c) Arrangements to defray some or all of the expenses incurred by any person making an effort to acquire further occupational training or up-grading?
- d) Distribution of expenses through a subsidy from the public authorities to the educational system and a tax on employers similar to the British system under the Industrial Training Act?
- e) Stimulation of efforts by the private sector through a reduction in the tax on firms which undertake educational and training schemes?

III

CONCLUSIONS OF THE CONFERENCE

The second OECD Intergovernmental Conference on the Utilisation of Highly Qualified Personnel was held in Venice, from 25th to 27th October, 1971, under the chairmanship of Mr. Pier Luigi Romita, Under-Secretary of State for Public Instruction, Italy. It was attended by senior policy-makers and officials in the Member countries responsible for educational and manpower policies, as well as by representatives of international organisations, of employers' and employees' associations and of professional associations.

The Conference, on the basis of a series of Secretariat studies and national reports, discussed the main issues involved in the field of highly qualified manpower utilisation in terms of overall policies and co-ordination, employment and education prospects in the 1970s, career and mobility, and education and training in the course of working life.

Participants noted that, since the first Conference on this subject, held in Paris in September 1966, important changes had taken place in the employment situation as well as that of education in the Member countries. These changes, resulting, among other factors, from the rapid expansion of education, have led, in a number of countries, to a paradoxical situation of a surplus in the overall number of people with higher education qualifications available in the labour market and, at the same time, shortages in the supply of specific qualifications required by a rapidly evolving economy and society. The centre of attention, therefore, had shifted in these countries from problems of supply to those of alleviating structural and qualitative imbalances in the labour force, which are implied in the concept of improved utilisation policies. This calls for new and intensified efforts in developing the basic research skills and methodologies whereby these new problems could be analysed to provide the necessary guidance for policy-making.

The Conference recognised that responsibility for the articulation of such policies would rest essentially with the Governments, in close consultation with the other social partners involved, particularly employers' and employees' organisations. In this context, participants noted with satisfaction that a number of Member Governments had already taken specific policy measures in this direction, though as yet, these have been mostly confined to training, and education schemes. For such schemes to be fully effective, however, special action also would need to be directed towards improvements in the personnel policies of employers, including the public sector.

The Conference discussed in detail the requirements for manpower policy in the field of in-career education and training, and mobility and career development, and its specific conclusions on each of these items are given below.

In adopting these conclusions the Conference stressed that, for the purposes of long-term policy, it would be necessary to envisage new ways of relating the educational system to individual, and social and economic needs. In particular, an alternative to the ever-lengthening process of youth education, whereby alternating periods of work and education can lead to a more satisfying and realistic process of individual development in modern society, should be explored. This could take the form of a system of "recurrent education" in which educational opportunities are spread throughout working life, and related to the motivations and aspirations of the individual as they unfold in his active life.

Such a new concept of educational policy could only succeed if the whole of formal education and training activities in industry and commerce are seen as part of an overall approach to the educational process. Such an approach implies a more active partnership between education, employment and other governmental authorities, industry and commerce, as well as organisations representative of the various social groups involved.

Continuing in-career education and training

Regarding the specific problems of continuing education and training in working life, excluding the more general cultural aspects which need to be taken into account by educational authorities, the Conference noted that:

- The first objective of modern society should be the improvement of the quality of life for everyone.

- While in this society rapid progress in technology and productivity makes it possible to satisfy an ever-growing demand for goods and services, the organisation of labour calls for the provision of qualifications of a greater variety and at higher levels, expressing the changing needs of production.
- The increased social demand for education leads to a continuing growth in general education and professional qualifications, expressing the aspirations of individuals.
- This twin development has, in some countries, given rise to imbalances as between the aspirations of graduates and the possibilities which exist for them to be integrated smoothly into the production process.
- In-career education and training, given concomitant manpower surpluses and deficiencies, are an important means for re-establishing the equilibrium at the individual, local and sectoral levels, between qualifications and jobs; this trend will acquire even greater importance in the course of the next decade.

The following conclusions were adopted:

I. There is need for instituting effective policies for in-career education and training, with a view to ensuring the harmonisation of individual objectives in education with those of the economy and of society.

II. There is need for a major effort to provide accurate and up-to-date information on the distribution of qualifications and job requirements within the economy and the labour market, in order to facilitate a meaningful qualitative and quantitative planning of education and training, as well as to enable the autonomous guidance of individuals to take place in the full knowledge of all the factors involved, in both their professional careers and their studies, without prejudice to the cultural development of the individual and his personal fulfilment.

III. A number of acute problems facing certain Member countries call for immediate or early solutions, in particular:

- a) the induction of young graduates into their first employment, and, in this context, the appropriate modification of post-secondary curricula;
- b) the absorption of graduates into a broader range of occupations than those traditionally filled by them;

- c) maintaining, improving and up-dating of knowledge;
- d) up-grading and extension of qualifications;
- e) the conversion of unemployed or under-utilised qualified personnel, and particularly young graduates who, on leaving higher education, do not find employment corresponding to their qualifications;
- f) safeguarding the interests of those young graduates, and highly qualified personnel generally, who need conversion.

IV. Every individual, irrespective of the economic sector to which he belongs, should be enabled to have during his working life such education and training as he may need and desire, in the context of his career development and the needs of society; this could be achieved for example by means of support received either through a system of study grants or release from employment.

V. The State should organise activities in continuing education and training, as well as stimulate corresponding action initiated by private and public enterprises and professional and other organisations; to this end, recourse should be had to various means, as appropriate: for example subsidy or levy/grant schemes or tax relief to firms together with the provision of the necessary facilities.

VI. It must be recognised that these aims can only be achieved by the participation of industry, business and public administration, especially by more effective manpower planning and career development. Also, it is imperative that a well developed co-operation be established between the educational planners and prospective employers. The planning and implementation of education and training programmes should be carried out in collaboration with appropriate government departments as well as employees' and employers' organisations.

Mobility and career development(1)

Before discussing the role which mobility and career development can play in the short term in promoting a better "match" between the qualification and the utilisation of highly qualified

(1) In the absence of time for formal plenary discussion of the conclusions under this term, the Conference agreed that they should be circulated as presented by the Chairman of the Working Group set up by the Conference for this purpose.

manpower, it is useful to state the broad framework in which they can be expected to operate in the near future.

A first point is that although their numbers are expanding rapidly, highly qualified manpower are only one class of the labour force and it is not meaningful to discuss their situation in isolation from that of the labour market at large. On the other hand, highly qualified manpower is a very broad concept covering a number of types and levels of manpower and it is possible to have at the same time shortages in some areas and oversupply in others.

It seems, however, that in recent years there has been an important change in the overall employment situation for highly qualified manpower in many Member countries. After a period of buoyant demand, a rapid increase in educational output, combined in several countries with a general slackening of demand, has produced a tendency towards oversupply in some areas, at least in terms of numbers.

There have also been significant changes in social outlook which will affect mobility in the future, notably that the "new labour" force has both new work attitudes and aspirations. Whilst in the past, employees were essentially interested in economic factors such as salary levels, job security, pensions etc., these "new" workers are seeking a career which is not only financially rewarding but also personally satisfying and socially useful.

It is not yet clear whether these changes are purely temporary and that traditional patterns will be restored, or whether the new forces at work will provide a radically different long-term framework for mobility and career development.

By "mobility" we mean, broadly speaking, changing jobs, whether or not this is accompanied by a change in employer. In this sense from the economic point of view, mobility is one way of adjusting short-term imbalances between supply and demand for specific highly qualified manpower classes. From the point of view of the individual, it is the way in which he pursues his career.

The type and direction of mobility may vary considerably between countries or over time. Thus, in Japan, the "family tradition" means that nearly all mobility occurs within the firm, whilst in other Member countries, much more "external" mobility is usual. Similarly, at different times or in different fields, there may be "upward mobility" (promotions), "outward mobility" (change of field or area of employment) or even "downward mobility"

which means changing to a job with lower salary or social status: it may be "voluntary", undertaken willingly by the employee, or "forced", that is dictated to him by his employer, or by market forces.

Given this varied pattern, it is clear that mobility is not in itself either wholly recommendable or wholly deplorable. Ideally, each case should be discussed on its own merits in the light of prevailing circumstances. However, a broad aim might be to encourage only "beneficial" mobility, that is job changes which improve the matching of skills and utilisation, encourage the dissemination of knowledge and techniques and which are felt by the employee to be a positive contribution to his career.

In periods of expansion these objectives go hand in hand, and it appears that the situation in the past has been broadly satisfactory, although there were some complaints from firms about excessive turnover bidding up wages, from employees about artificial barriers to change such as restrictive pension, insurance and holiday agreements, and from manpower planners about structural barriers between sectors. It is still unclear whether mobility will continue to be "beneficial" both to employer and employee in a contracting or stagnant economic situation (e.g. promotions are slower, voluntary transfers more difficult, recruitment restricted, etc.).

Less favourable market conditions and the high annual flow of graduates create a situation where highly qualified manpower have to modify their career aspirations. In addition, it becomes more difficult to meet individual income and other expectations. A question well worthy of examination is whether these difficulties can be met or forestalled by employment and manpower policies in the short term and by improved co-ordination of educational, manpower and economic policies in the longer run.

Thus, when considering how to promote "beneficial" mobility in the future, the following points should be kept in mind:

- a) The "forced" mobility now being experienced by highly qualified manpower in certain sectors raises important social, human and technical problems;
- b) "Voluntary" mobility still has an important role to play. Voluntary "outward mobility" of highly qualified manpower into new fields and areas of employment may be beneficial both to the economy and to the individual, whilst forced "downward mobility" rarely produces satisfactory overall results.

It can be concluded that, although it is difficult to decide what the pattern of mobility should be, and although Governments actually may have little means to influence it, mobility barriers and hostile attitudes towards mobility should be examined. Also, employment policies, career patterns, labour market operations and development of qualifications cannot be thought of today without taking changed market conditions into consideration. This leads to the following issues.

a) The role of public employment agencies

Unemployment among the ranks of experienced managers, engineers and other categories of highly qualified manpower has recently emerged as another example of the changed circumstances of the group.

Traditionally, many persons in the highly qualified manpower categories relied only marginally on the public employment agencies for assistance in finding suitable positions. A reassessment of the role played by these public agencies may now, however, need consideration in the light of the recent trends.

b) Career patterns

The preceding analysis also suggests that our idea of career development will need to be re-examined in the light of changed employment conditions. It is not clear whether, in future, the economy will offer the same promotion possibilities as before and there is even some fear of competition between new graduates and older highly qualified manpower who acquired their skills mainly by experience.

The need for better utilisation of skills and aptitudes and for opening up wider possibilities for personal and professional development for the individual leads us to hope that employers will be increasingly favourable to types of mobility which improve the efficiency of manpower distribution and encourage the flows of ideas and techniques. They should try to improve the match between incomes and salary increases and real function, and contribute to reducing institutional barriers to mobility.

The time has thus now come when firms must improve and expand their manpower planning activities to allow for in-career changes, and this could help them to avoid aggravating existing disequilibria.

c) Qualification development

It is not realistic to discuss qualification development in isolation from career patterns. Whilst, in the past, the former was mainly concerned with giving initial training or teaching specific skills needed for promotion, it is now more a question of adapting and up-dating qualifications in response to changes in techniques and to the vicissitudes of the labour market.

Employers are thus called upon, in collaboration with their employees, both to expand their education and training activities and to improve their manpower planning efforts; Governments should play their part by encouraging these activities and should themselves take an active role when necessary, for instance by helping smaller firms to this end.

This wide variety of education and training needs requires great flexibility. This may necessitate considerable co-ordination by Governments.

BOOK II

BASIC REPORTS

I

EMPLOYMENT PROSPECTS IN THE SEVENTIES

by

Eric Esnault

Directorate for Scientific Affairs

TABLE OF CONTENTS

Summary	129
Preface	137
Chapter I	
THE NEW INDUSTRIAL SOCIETY	139
A. THE ACTIVITIES	140
1. Changes in industrial activities	140
2. Development of the tertiary sector	146
3. Changes in functions	147
4. The development of social policies	151
B. THE MEN	152
1. The development of education	152
2. The spirit of education	161
3. Men at work	163
Chapter II	
FUNCTIONS AND QUALIFICATIONS	165
A. QUANTITATIVE AND QUALITATIVE DISEQUILIBRIUM	165
1. The causes of disequilibrium	166
2. The foreseeable disequilibrium	171
B. THE UTILISATION OF AVAILABLE QUALIFICATIONS	177
1. The criteria of utilisation	178
2. The development of qualifications	184
C. THE ROLE OF THE EDUCATION SYSTEM IN FORMING QUALIFICATIONS	187
1. Relation between qualification and certificates .	188

2. Educational objectives and planning	195
3. Complementary vocational training	197

Chapter III

CAREER PATTERNS	199
A. RECRUITMENT AND THE ORGANISATION OF THE LABOUR MARKET	205
B. MOBILITY AND CAREERS	206
C. WHAT IS TO BE EXPECTED FROM COMPLEMENTARY EDUCATION AND TRAINING?	209

LIST OF TABLES

1. Distribution of the active population in France and in the United States	141
2. Distribution of industrial firms by persons employed	144
3. Qualified persons in industry by size of establishment - France, 1964	145
4. Enrolment ratios at each level of education	153
5. Increased enrolments in general and technical education and teacher training from 1951-55 to 1961-65	156
6. Increased enrolments in various branches of university education from 1951-55 to 1961-65	157
7. Proportion of pupils in terminal secondary classes, by speciality - United Kingdom	158
8. Proportion of enrolments in technology	160
9. Engineering graduates by speciality - United States (1950-1963)	162

SUMMARY

The report sets out to show changes in the nature of employment problems. Hitherto the main problems have been connected with unemployment, migration, and workers' vocational training. The increasing complexity of the production mechanism and the influx of graduates on the labour market are going to make the utilisation and education of highly qualified personnel of vital importance from the economic and social standpoint.

The report is based on a comparison between the activities generated by demand in the new industrial society and the men available to perform them. This comparison is a more advanced form of the classic supply-demand analysis, in which efforts are made to take account of qualitative factors, in particular the content of functions.

A. The Activities

The report seeks first of all to define the main characteristics of changes in productive activities. Emphasis is laid on the following general features:

- the development of large corporations in which technical progress and highly complex organisation call for more advanced and more specialised qualifications;
- the continuing existence of small businesses, which have perhaps a more specific role to play than in the past and which also call for high qualifications, more practically based but more adaptable and more open to change;
- the increasing importance of the State in the industrial sector, either directly as an employer in nationalised industries, or indirectly as the main customer of highly specialised industry or research;
- the existence of less developed businesses or sectors which will gradually be squeezed out by increasing competition, thus releasing on the market relatively unskilled personnel;

- the considerable expansion of the tertiary sector which comprises activities of very different kinds and outlook, but into which the industrial attitudes and methods are tending to infiltrate.

These remarks on structural trends are supplemented by an analysis of the factors determining changes in functions:

- technical progress, which calls for higher levels of qualification and which continually generates change, and consequently adjustment difficulties;
- easy communications, leading to market expansion and demanding from the staff constant vigilance, outward-looking attitudes, and social and occupational integration;
- stricter management methods, implying more precisely defined functions and greater specialisation in a more complex organisation.

These three factors are more or less prominent in the various sectors of activity and indicate two components of qualification: the technical component, relating to the material or machinery with which the activity is concerned, and the functional component, relating to the place in the productive organisation.

Lastly, the report emphasizes another factor determining the character and framework of productive activities: the development of social policies which have already substantially altered conditions of employment and sometimes acted as a brake on socio-economic development.

B. The Men

Statistics show that hitherto vocational qualifications were largely the result of work experience. Today young people are educated to a much more advanced level. The report considers whether this higher level of education has led to an increase in level of qualification⁽¹⁾ and whether it does not produce a change in attitudes and motivations.

The answer is on the whole rather pessimistic; in particular, there has been a decline in relative and sometimes even in absolute terms in student enrolments in technology and secondly in science; in general, educational growth has not been favourable

1) The report defines qualification as the ability to produce a concrete result.

to the development of qualifications and attention is drawn to the need to remedy this by action on educational structures and orientations.

To this conclusion, drawn from a simple quantitative review, should be added two remarks on the spirit of education:

- young people who are no longer forced to start work at an early age stay at school in a world remote from the cares of working life; education does not motivate them for their subsequent career;
- in disciplines with a vocational application the schools often give abstract theoretical instruction which scarcely prepares the students for the jobs they may be offered.

Educational growth, however, is not the only factor determining the availability of qualified personnel in the next decade. The report draws attention to the changing relations between men and work. This is due to three factors:

- many young graduates feel overqualified or under-used when they compare the intellectual level of their studies with the job functions they may perform;
- the size and complexity of production structures make it less and less easy to perceive the importance and significance of each worker's job;
- easier living conditions and a less clearly defined concept of work may reduce the worker's interest in his job.

FUNCTIONS AND QUALIFICATIONS

Under this heading the report deals with the comparison between labour market requirements and available qualifications.

A. Quantitative and qualitative imbalances

The first result of this comparison is to reveal a number of imbalances, with the consequent danger of unemployment and shortages. A rapid review of the causes of disequilibrium shows that imbalances no longer occur solely among manual workers, but also at the level of highly qualified personnel.

The nature of the disequilibrium naturally varies in different countries. In general, however, the following groups may be mentioned:

- a) manual workers, who are not the subject of this study, but a shortage at this level reacts on the general employment situation and the decisions of the entrepreneurs;
- b) young graduates, who may be subdivided into several categories:
 - secondary school leavers with no vocational qualification but who can be given further training by means of post-secondary courses or in Ministry of Labour centres;
 - university graduates with no vocational qualification or with one which is no longer in demand and who therefore need retraining;
 - graduates whose qualifications are not adapted to the present needs of the economy and whose integration at present devolves on the employers;
- c) technicians, already in short supply in several countries whose educational systems are largely responsible for this shortage;
- d) highly specialised technologists and researchers - a very vulnerable group affected by the rapidity of technical and economic change;
- e) older executives, whose employment difficulties seem to derive from the existing conception of career and mobility and from a loss of professional competence which is frequently the result.

B. Utilisation of available qualifications

Imbalances are the symptoms of inefficient utilisation which is far more general and perhaps far more harmful to the economy.

The report considers first of all how to assess the utilisation of available qualifications. If qualifications are judged by results, it is tempting to take profitability as the criterion of utilisation; but profitability is often difficult to evaluate for highly qualified personnel and the concept of objectives (management by objectives) is more appropriate, though mainly applicable to business executives.

If we rule out the results, we then come to the men; with the men available, what result can we expect?

The criterion of knowledge utilisation or relevance which has been advanced is more appropriate in cases of shortage of qualified personnel than for the situation of maladjustment predicted for the seventies.

This review shows that utilisation is not very suitable for mathematical analysis(1); it leads to the conclusion that it is necessary to identify and develop aptitudes and that utilisation is based on three conditions:

- the existence of a stimulating work environment, in which each worker can perceive his role, be interested in the result of his work and retain an outward-looking attitude;
- career openings, i.e. the possibility of acceding to new functions and new responsibilities taking account of aptitudes and experience;
- further training, which should not be confined to immediate objectives of adaptation to the job performed but should give scope for vocational development.

These conditions are in fact only the expression of an opportunity for development, which is a greater incentive to highly qualified personnel than immediate benefits such as wages, bonuses, etc. This, combined with the prevention of disequilibria, is one of the objectives of a utilisation policy.

C. Role of the Educational System

The review of the employment situation, in particular the use of highly qualified personnel, is an essential component in the definition of education policies. Longer schooling gives the educational system an increasing responsibility for vocational preparation, from the social or the strictly economic standpoint.

Statistics show that the educational system has so far played a relatively modest role in the acquisition of qualifications; except in certain sectors (in particular, professionals), qualifications are often acquired through experience on the job.

The changes in productive activities and longer schooling make it essential for school-leavers to have a minimum vocational qualification. This implies the reorientation of general secondary education, which is in practice terminal education for the great majority of students, and the adjustment of the content and structures of higher education.

The report also contains an analysis of qualification-certificate relationships, which have hitherto provided the basis for methods of structure elaboration and methods of educational planning.

1) In the present state of knowledge and information.

Such methods were based on some correspondence between occupational structures and the structure of educational output, and on the assimilation of level of education to level of qualification. The report shows that these two assumptions have now lost much of their value and that the corresponding planning methods are of little interest except for specific sectors or professions (teachers, doctors, etc.) insofar as their conclusions are judged politically acceptable.

The report does not pursue the theme of in-service training, which is the subject of the Basic Report II.

CAREER DEVELOPMENT

The functions of highly qualified personnel generally develop during their working life. Careers are therefore a means of adjustment to the needs of the economy, or a consequence of economic trends.

Career development arose from the need to fill managerial posts, the increasing demand for qualified personnel and individual aspirations. These forces have hitherto been combined and have made it possible to adjust to economic requirements, which called for a higher level of qualification rather than an adjustment to change.

The report questions whether career development will still be possible in future, and in what form. It then considers the conditions of such development, i.e. the operating conditions of the employment market.

A. Recruitment and the organisation of the employment market

One prerequisite for the realisation of development possibilities is the existence of relevant information and appropriate recruitment methods.

In this connection the report asks a number of questions:

- Do the various recruitment media (advertisements, agencies, associations, etc.) have a specialised target and, if so, do they cover the whole of the labour market for highly qualified personnel?
- Do the enterprise and the "trade" constitute in practice a first constraint on the circulation of information and on the field of recruitment?

- Are there in practice career channels constituting a second constraint and what are the forces shaping them?

It is to be feared that the employment market for executives and managers, like their qualifications, has not yet received all the attention it should and that only partial answers can be given to these questions.

B. Mobility and Career

Mobility - moving from one enterprise to another - is a means of adjusting to changes in occupational structures and is often a necessary condition of career development. Employers have however been rather hostile to mobility hitherto. The report asks whether the transition to an economy of change will not constrain them to alter their attitude and whether it is not preferable to adopt a more open policy before being forced into it.

Mobility is not just a permanent means of adjusting to requirements and does not only have disadvantages. Experience shows that it is a powerful transmitter of technical progress and modern methods of work and a powerful means of stimulating group dynamism and maintaining staff competence and adaptability.

There are however many physical, institutional and psychological obstacles to mobility and for highly qualified personnel the largest obstacles are not the physical ones:

- institutional obstacles are linked with social benefits and the context in which they are negotiated. The most powerful is probably non-transferability of pension rights;
- psychological obstacles are linked with the occupational environment, technical or functional overspecialisation, and different working methods.

Many obstacles to mobility in fact derive from the prevailing conception of a career, which gives the elite functions commensurate with their aptitudes, but which, in the absence of more dynamic management, under-utilises part of the staff whose competence and adaptability are bound to decline.

C. Further Training

Dynamic analysis throws fresh light on the need for further vocational training(1). The report merely draws attention to:

1) See the Basic Report II.

- the diversity of requirements: the conventional further training policy was essentially a policy for social advancement and acquiring qualifications. It is now a policy for adjustment, serving widely differing levels and objectives;
- the nature of objectives: the objectives of further vocational training today seem to be, in order of importance, the redeployment of the unemployed, the specific needs of works personnel, and the overall adjustment of qualifications. The report asks whether this order of priority will or should be altered in the next ten years;
- the complementarity of mobility and further training as tools for adjusting or developing qualifications.

FINAL REMARKS

If any conclusion were to be drawn from this study of employment prospects, it would merely stress:

- the need for qualification utilisation and development policy to meet the dangers of imbalances and short- and medium-term crises;
- the need for a longer-term reorientation of education policies to take account of employment realities and the characteristics of the modern industrial society.

PREFACE

The term "Employment Prospects" generally implies a statistical analysis of manpower supply and demand, usually supplemented by a review of questions of unemployment, immigration and social legislation. But the present paper is a piece of forward thinking and empirical research rather than a statistical analysis.

For we feel that in this very next decade the nature of employment problems will be radically transformed as a result of:

- the spread of technical progress and the increasing complexity of the productive mechanism;
- the expansion of international trade and fiercer competition, which are already leading to the redistribution of productive activities among countries;
- the expansion of education, which no doubt helps to improve the qualifications of the work force but which, in conjunction with higher incomes, alters a man's attitude to work.

In the seventies employment problems will not be confined to manual workers but will also affect highly qualified personnel - managers and executives, technologists and technicians, researchers and teachers - whose numbers and political strength are increasing.

This report shows the nature and extent of the impending crises and conflicts, the first signs of which have already appeared in several countries; it considers what measures and policies should be adopted to forestall or alleviate these imbalances.

One of the first conclusions of this forecast study is that the same measures and policies will make it possible to achieve both the social objectives of full employment and individual development and the economic objectives of dynamism, output and competitiveness.

But the main conclusion is that these measures and policies, which have been grouped under the convenient heading of utilisation policy, necessitate continual concerted action among the

education and employment authorities, the employers' associations and the trade union federations.

The time is past when each body could choose its own objectives and pursue its own policy; such an attitude can lead only to barriers and conflicts, several of which are already apparent. Only by joint research and action will individual measures on education, employment, mobility, careers, or complementary education and training be co-ordinated instead of conflicting with each other, and permit economic and social progress.

Chapter I

THE NEW INDUSTRIAL SOCIETY

Since the Second World War economic growth has brought far-reaching changes in social life - changes that are not confined to statistically measurable increases in output or income, but which affect the framework of daily life, the aspirations and behaviour of each individual, and the very nature of vocational activity. No doubt these changes are reflected differently in the different countries, in terms of their own level of development and civilisation; yet even in the least industrialised countries where enterprises integrated into a world economy coexist with a traditional agriculture or handicraft sector, applied technology and industrial methods have transformed living conditions.

The industrial society carries within itself the seeds of its own transformation. Higher incomes create new needs, and the organisation of production is continually thrown back into the melting-pot because of the change in demand. The industrial society's target has so far always been to increase production in all sectors, but today production may well exceed demand(1). The society which grew out of the concentration of workers in factories was very different from the rural world of landowners, tenant-farmers and peasants. An urbanised society, composed of highly qualified managers and technologists, of whom nearly half are engaged in the tertiary sector, offers an equally great contrast to the old industrial society(2).

Continued expansion in this society raises new problems resulting from increased international competition and disparities between employment market needs and available qualifications.

1) Cf. E.F. Denison, Sources of Economic Growth in the U.S. and the Alternatives Before Us, 1962.

2) Garth L. Mangum, What Economic Theory in the Post Industrial Society? 1970.

At a time when this new industrial society is taking shape, it is expedient to compare trends in labour market needs and in available qualifications. Only a few years ago, such a comparison would have implied a statistical survey linked with the forecasting of development plans; it was still possible to quantify the evaluation of the labour force. Today such figures are meaningful only for specific categories of workers; we are therefore forced to make a more empirical, more qualitative study owing to the lack of appropriate statistical support. This comparison, however, leads to sufficiently precise conclusions from which the consequences for national policies and employers' personnel policies can be inferred.

A. THE ACTIVITIES

It is difficult today to get an overall idea of the employment situation and the nature of occupational activities. The modern economy has become diversified with the multiplication of needs and products; it has been organised to adjust to mass production and broader markets. We shall consider below the main characteristics of its development.

1. Changes in industrial activities

In the early days of industrialisation the techniques and equipment used in factories were generally rather elementary, so that the labour force employed was usually relatively unskilled and consisted of what would nowadays be called operatives or semi-skilled workers, while the hierarchical structure was based more on authority than on technical qualifications.

This is no doubt an over-simplified view: the basic techniques of modern industry, except perhaps in the electronics and nuclear engineering sectors, were evolved at this period and have since merely been perfected and generalised by the systematic application of industrial engineering methods. This representation of the occupational structure in the early stages of industrialisation is however interesting precisely because it is overdrawn. It has given birth to conceptions and economic doctrines based on the idea of an undifferentiated, interchangeable labour force which still has a more or less conscious influence on policies and attitudes.

Yet at that time the number of workers in industry and mining represented only a small proportion of the work force. In the United States, about 1900 for instance, 25 per cent of the work force were employed in the industrial sector, and this figure includes the handicrafts and the professions, which had the highest qualification density.

It therefore appears that the current conception of employment in the early days of industrialisation is mainly derived from the special importance of the economic and social problems created by the expansion of this sector and from the political role played by the working-class population. It should also be noted that this employment situation in a special sector of economic organisation led to the formation of institutions and interest groups - like the trade unions - which still today in many countries play an essential part in the elaboration and implementation of employment policies.

Table 1

DISTRIBUTION OF THE ACTIVE POPULATION IN FRANCE
AND IN THE UNITED STATES(1)

Country	Year	Percentages		
		Primary Sector	Secondary Sector	Tertiary Sector
France	1901	42	30	28
	1954	26.7	36.8	36.5
	1962	20.6	38.6	40.8
United States	1850	65	18	17
	1900	30	25	39
	1950	12.0	36	52
	1960	7.6	35.2	57.1

(1) Jean Fourastié, Les 40.000 heures, Paris, 1965.

However, the nature of work in the industrial sector has changed considerably since that time, first through the existence and mobilisation of increasing capital resources, and secondly through the application of new techniques and the development of new products. The modern industrial sector has thus become a highly diversified productive mechanism, where everyone must have fairly advanced technical qualifications and take a share of responsibility for the operation and profitability of the system.

With this new productive mechanism and the appearance of large corporations, it has been possible to increase industrial productivity and raise the standard of living. It is now well known that this higher productivity in the developed countries is not solely attributable to capital investment: the productivity increase is the result of a more highly qualified active population, better business management, better adaptation of equipment and products, better use of abilities.

But is the industrial sector itself really just an aggregate of large corporations in which work is highly differentiated and organised and where production is strictly planned? From the standpoint of manpower utilisation and distribution, this is not entirely correct and represents only a tendency.

The first comment that may be made on this conception relates to the continuing existence of small and medium-sized businesses, whose purpose, despite broader markets, has not essentially altered since the Industrial Revolution. While some small businesses are squeezed out or swallowed up by a more powerful or more dynamic group, others come into being, subcontracting for certain products, producing highly technical or specialised equipment, or serving a geographically limited market for the distribution and maintenance of the complex machinery and products of modern industry. In the OECD countries at least three out of four industrial firms employ fewer than 50 people.

It is clear that in terms of functions and the need for qualifications, the continuing existence of a large proportion of small and medium-sized businesses throws doubt on a picture of modern society based on the large industrial corporation. No doubt the small business is no longer the same as it was in previous decades: today it must be more specialised and have a great adaptability. This sector of employment therefore makes heavier demands than the large corporations, whose organisation can be adapted to the personnel available or which have facilities for training manpower for the functions to be performed. And if we look, not at the average size of industrial firms, but at the distribution of personnel according to the size of the employing organisation, even in highly developed countries, we can measure the importance that ought to be attached to training workers in small and medium-sized businesses and their importance in the continuation of expansion.

The true facts of employment, however, do not entirely bear out this conception of highly specialised small businesses

supplementing the activity of large corporations engaged in mass production. This represents an ideal situation which it may be wished to attain.

In fact there are still in all countries many businesses, even in the industrial sector, which survive only through the inertia of their customers and the lack of market information, in particular on the possibilities recently offered by the opening of frontiers and the liberalisation of trade. The same might be said of certain large corporations which have more influence over government decisions on import restrictions; large corporations have not all reached the same stage of development.

In this connection, the technologically advanced industries are not necessarily those which produce the most sophisticated products. The rest, i.e. the less developed and less competitive, still represent a fair proportion of employment in industry; and on these grounds they can be protected, since they can use workers whom it would be hard to use elsewhere, either because their qualifications are too narrow, or because they are inadequate, which is most generally the case. It is therefore fortunate that, just as mechanisation and automation developed at the same time as the rise in the educational level, competition and market conditions have not been so severe as to eliminate sectors of employment too rapidly.

Employment in the industrial sector in 1970 is therefore still very heterogeneous because of the continuing existence of firms of very different sizes, but also because of great diversity in the level of development achieved in management and production techniques. It is remarkable that within the same country and even within the same firm, highly organised services using the most advanced optimisation methods may coexist with completely unorganised services, whose production is in no way adjusted to demand and which use old fashioned or unprofitable and inefficient techniques. Perhaps, as indicated, this regrettable situation from the standpoint of production and competitiveness makes it possible to use less qualified personnel who would find it difficult to adjust too rapidly to an ideal organisation.

A further feature in this picture of employment in industry is the increasing importance of the State as a customer of industry and even directly as an employer. Although public enterprises should as a rule be competitive, attitudes often differ from those of private industry with regard to the use of qualified personnel and unskilled labour, and sometimes tend to spread into

Table 2
DISTRIBUTION OF INDUSTRIAL FIRMS BY PERSONS EMPLOYED

Firms employing	Austria 1964	Belgium 1967	Canada 1966	Denmark 1965	Finland 1965	Germany 1966	Italy 1961	Japan 1966	Norway 1967	Portugal 1964	Sweden 1965	Switzer- land 1965	United Kingdom 1963	United States 1963
Less than 10 pers.	96	55(a) 36(b)	33.2(a) 49.2(b)	51(a) 40(b)	97.2	43.9 32.2 10.2	93	72.9 21.9	67.1 24.9	92.3(a)	73.2 19.8	73.1 20.5	89.3	52.3
10 to 49			8.1					2.9	4.1	3.6	3.3	3.1		30.7
50 to 99			8.1					2.0	2.3(c)	3.4	2.9	2.8		7.5
100 to 499			0.9	9.0		11.1	6.0	0.2	1.6(d)	0.5	0.4	0.3		7.9
500 to 999	4.0	9.0			0.5	1.5	1.0	0.1	-	0.2	0.4	0.2	1.3	1.0
1,000 and over			0.5			1.1							1.5	0.6

Data refer to different types of firms and activities according to the country (Austria: enterprises, including handicrafts and the primary sector; Canada: enterprises, including handicrafts and the primary sector; Denmark: enterprises, including handicrafts and the primary sector; Germany: local units; Italy: enterprises; Japan: enterprises; Norway: enterprises; Sweden: enterprises; Switzerland: enterprises; United Kingdom: enterprises; United States: enterprises).
Distortions due to differences in definitions are unimportant in the lower size categories (small firms do not usually have more than one establishment), but may be more significant in the larger size categories.
(a) Less than 5 employees.
(b) 5-49 employees.
(c) 100-499 employees.
(d) 200 employees and over.
(e) 3-50 employees.

Source: OECD Observer, October, 1970.

Table 3

QUALIFIED PERSONS IN INDUSTRY BY SIZE OF ESTABLISHMENT - FRANCE
(Aged 16 and under as of 1st January, 1964)

Persons employed in establishment	Male			Female			Male and female		
	Qualified Personnel (1) a)	Economically active population b)	Per cent a/b	Qualified Personnel a)	Economically active population b)	Per cent a/b	Qualified personnel a)	Economically active population b)	Per cent a/b
0 employed	4 400	229 000	5.0	-	93 400	5.4	4 400	322 600	5.1
1 to 5 employed	10 600	618 400	13.5	2 800	182 000	10.4	13 400	800 400	12.6
6 to 10 employed	4 800	258 000	5.6	-	75 200	4.3	4 800	333 200	5.3
11 to 20 employed	4 400	295 600	6.4	5 900	104 200	6.0	10 200	399 800	5.3
21 to 50 employed	16 400	495 000	10.8	3 400	228 700	15.0	16 800	721 600	11.4
51 to 100 employed	14 800	594 600	11.0	2 800	245 000	11.9	16 800	747 600	11.8
100 to 500 employed	41 000	1 049 200	22.8	1 800	480 800	27.5	42 800	1 530 000	24.1
501 to 1,000 employed	23 400	425 400	9.3	1 600	151 200	8.7	25 000	576 600	9.1
Over 1,000 employed	41 600	718 400	15.6	3 200	188 400	10.8	44 800	906 800	14.3
TOTAL	161 400	4 593 600	100.0	17 500	1 745 000	100.0	179 000	6 338 600	100.0
									2.8

1) All people with Technician's diploma or University level diplomas

Source: J. Grais and B. Salais. "The Employment and Occupational Mobility of Highly Qualified Personnel in France", CEB, 1965 (mimeographed document).

private firms working for the State or large corporations whose structures are similar to those of public enterprises; this difference in employment conditions is even clearer in the case of the public services or major government programmes.

2. Development of the tertiary sector

Industry however does not account for the whole of economic activity, even if its outlook and methods are tending to pervade the whole of society. While a country's level of development could be gauged from the decline of employment in agriculture in relation to industrialisation, the development of the industrial society is measured by the expansion of the tertiary sector, which is the main characteristic of the employment situation in 1970. In the most highly developed countries it accounts for 40 to 60 per cent of total employment and is the most rapidly expanding sector. It also absorbs the largest number of graduates from technical and higher education - nearly three-quarters in France in 1964(1).

One of the contradictions which the new industrial society has to face is the contrast between the industrial outlook and methods which produced it and provide its strength, and the development of the tertiary sector comprising activities of an entirely different nature and outlook. The industrial attitude, which has proved efficient in economic development and management, is tending to spread into other sectors, either for reasons of greater rationality or efficiency, or because the machinery, equipment and environment created by industry force a change in attitudes. This contradiction is felt all the more because these occupations are the ones least prepared for this conversion and the unrest in the universities may be said to be one of the first manifestations of it.

Finally, we should emphasize the considerable importance of government departments and government services, especially education, in this sector. We have seen that this sector absorbed a large proportion of graduates from higher education, not because its activities are highly technical but rather because of the special conditions of recruitment to government departments.

1) "The Employment and Occupational Mobility of Highly Qualified Personnel in France" - INSEE/OECD Document.
In Japan the proportion of graduates entering the tertiary sector fell from 72 per cent in 1954 to 63 per cent in 1968; this decline is no doubt due to the considerable industrial expansion in that country.

3. Changes in functions

These few remarks give a first insight into the current employment situation and the long period over which it has developed; they throw light on the quantitative forecasts prepared for each trade by the employment services⁽¹⁾. However, an analysis of employment trends should not only be concerned with the overall or sector level; it should also endeavour to predict what changes, at micro-economic level, will occur in functions.

One's first thought is to use the statistics relating to status or socio-occupational categories in order to identify the nature of activities, and the outlook and motivations of those engaged in them.

These statistics give mostly global figures on employment in the public sector, the structure of agricultural activities, etc. which broadly tally with the conclusions of the global analysis. They throw little light on changes in functions; the development of limited liability companies with salaried executives does not always permit any clear distinction between employer and employed; at the same time, the development of incentive schemes and profit-sharing systems may lead to radical changes in occupational attitudes and behaviour, especially in the technical and commercial field. It is also difficult to situate handicraft occupations between small business and purely commercial activities. This lack of precise statistics for economically and numerically important sections of the work force leads us to consider changes in functions from another standpoint, more empirical but certainly more interesting with regard to the qualifications involved and the corresponding training.

The factors determining changes in functions may be grouped under the following three headings:

- technical progress, often described simply as raising labour productivity. In the vocational world, that is to say, not from the economist's viewpoint but from that of workers, it is true that such progress has lightened human effort by removing the burden of arduous repetitive work, and that it is now responsible for an accumulation of equipment that has completely changed both domestic and occupational lifestyles. However, with the gradual

⁽¹⁾ Occupational Outlook Handbook, Occupational Outlook for College Graduates, U.S. Department of Labor, for example.

spread of technical progress, men who are ill-prepared for it are obliged to adjust to machines - or sets of machines - with which they are not familiar, which they do not know how to use and which they fail to master. A striking case in point is the use of computers.

- easier communications, which are of course the result of technical progress but which should be mentioned separately because of the economic and psychological consequences. Passenger and goods transport facilities and the transmission of information gradually make individual work or isolated activity impossible; personnel are gradually forced to use working methods in which information, co-ordination and control are just as important as technical competence; and at the same time they are forced into a social integration for which many are not prepared.
- stricter and more scientific management methods, which may not be any more efficient than the traditional empirical methods but which are made necessary by the changes in the nature of activities, both in financial matters and in work co-ordination. The introduction of these management methods, like the installation of modern equipment, calls for a considerable effort of adjustment - intellectual discipline on the one hand, in order to integrate into an organised group, and mental flexibility on the other hand in order to cope with change and rapidly to acquire the new knowledge needed.

These three factors have already played an important part in economic growth, especially the first. It is thought, however, that in most OECD countries they will exert their full strength during the next decade. Just as productivity was held back for a long time by lack of capital, technical and psychological unreadiness acted as a brake on the movement. This inhibiting factor will probably lose its force with the increasing level of education and the ever keener pressure of international competition.

The main problem in the next decade will therefore not be to devise types of training for trades that do not yet exist, but to extend to the whole economy management and working methods now found in the most progressive circles and to prepare the labour force to use them, by adapting vocational education as far as possible to more specific objectives and by carefully retraining serving personnel.

It will therefore be necessary in the first place to rationalise productive activity throughout the economy, infusing into the less advanced sectors more modern and more aggressive attitudes, and introducing stricter management methods into production, but above all into the commercial sector, since markets will soon expand into world markets owing to the ease of communications. This sudden extension of markets will be hazardous for conventional medium-sized businesses which are not prepared for it, and whose managements have often failed to keep pace with modern economic developments.

In seeking to define what shape this economic rationalisation will take, we may consider two concepts - technical specialisation and functional specialisation.

The degree of technical specialisation among qualified personnel should be commensurate with the extent and diversification of the labour market. Only the highly industrialised regions can offer specialists sufficient possibilities of employment, and recent experience shows, even in the United States, the need to preserve a certain adaptability, i.e. a moderate specialisation based on a fairly broad, sound, technical education. In addition, the degree of specialisation must be linked to the average size of firms: in small firms qualified personnel, whether technical, administrative or commercial, must always know something about everything so as to be able to assess and cope with every situation. How will things develop in the seventies? It is not certain, contrary to what is generally thought, that the average size of firms will increase, despite concentration; but the rationalisation of productive activity in large corporations and the specialisation of small ones is likely to lead on the whole to greater specialisation of work, which will perhaps be most resented in the tertiary sector.

If there is to be some development in the nature of the functions of qualified personnel, it must be linked with the rationalisation effort. Increases in productivity have hitherto been achieved through more rational use of available energy and equipment; future progress will be based on more rational use of brainpower. This progress will no doubt come from the more general and perhaps more efficient use of control systems and computers, but also from the better definition and coordination of the intellectual efforts of each individual.

We therefore perceive the growing importance of what may be called functional specialisation, as opposed to technical specialisation. This concept reveals close parallels between the jobs

offered by apparently different enterprises, but whose products are directed towards the same type of market, or which are roughly the same size, or which employ staff of comparable qualifications. It is certain that in Europe at least, qualified personnel generally have an adequate technical specialisation, but seldom a proper functional training; moreover, enterprises do not always offer sufficiently specific functions or careers, (i.e. a sequence of functions). It is therefore mainly in this field that we may expect to see changes in employment structures which, combined with the effect of a higher educational level among workers, will lead to the questions of careers and hierarchies.

This tendency to rationalisation, which is very clearly manifest today, unfortunately has its counterpart in the very multiplicity and complexity of the means and possibilities which it offers. The old-time craftsman knew his tools; today's industrialist and manager is often unable to handle the equipment and qualifications upon which he relies, and judges only by the results he obtains. This comment applies just as much to the businessman who acquires a computer, to the manager responsible for coordinating and controlling specialists whose techniques and even whose mentality are completely alien to him, and even to the customer who is incapable of choosing between two products by any criteria other than those of publicity. The result is that economic development re-introduces a random factor into behaviour and that rationalisation leads to a certain empiricism just as positive thinking brought back the taste for the irrational.

What are the practical consequences of this change in the pattern of employment? The present pattern of employment, like the organisation of work in enterprises, no doubt largely depends on the qualifications available on the national market, although most industrialised countries today resort to foreign manpower either for labouring jobs or even for highly qualified jobs⁽¹⁾; it must however be recognised that the pattern of employment is primarily determined by the trend of demand, the trend of the market and the expectations of the managers, who arrange their staffing and programmes in the light of more or less long-term objectives. The result is that it is the personnel who must adapt themselves as far as they can to the patterns thus forced upon

1) One naturally thinks of the braindrain and the attraction of scientists towards certain privileged areas; less is known about the part played by emigrants in certain countries, for example in the medical profession in the United Kingdom.

them; complementary training and immigration are the short-term instruments which allow a first adjustment which is far from being enough; the matching of supply and demand depends mainly upon the adaptability of man.

One may question the reality of this adaptation between structures and men, and that is the whole substance of the problem of utilisation. In the first place, the long tradition of the employment economics, which were primarily interested in the largest number, that is to say the working population, tends to give too mechanistic a view of the balance between supply and demand, to reduce it to a statistical problem and to neglect human adaptability. Furthermore, current observation shows that often, and especially among the higher grades, adaptation is apparent only and the caustic remarks of Parkinson and Peter are not without foundation. In any event they show the value of questioning current ideas about qualifications of manpower.

4. The development of social policies

Another characteristic of industrial society is the growing importance of social legislation. This trend is connected with the object of work, which is no longer merely to produce but also to ensure everybody a decent standard of living and access of health, education, etc. It is characteristic from this point of view that the United States authorities have been compelled to introduce a special allowance for people whose wages are below unemployment benefits.

Social laws and collective agreements have thus become an essential factor in the employment situation and must be welcomed today. Nevertheless, from the point of view of utilisation of qualified personnel they may sometimes appear to be obstacles to the necessary adjustments, just as protectionist measures may have been for prices. This is not the case when they take effect as a stabilising factor for incomes but it is the case when they perpetuate an anti-economic situation or when they impair the fluidity of the labour market. One can cite as an example the gap between the private sector and the public sector which led to the adoption of different and non-transferable retirement schemes.

It must however be recognised that the sometimes anti-economic character of social measures is usually merely the consequence of the crystallisation of existing separations resulting from legal status, the traditional isolation of occupations from each other or even from differences in status, mind and outlook.

B. THE MEN

The foregoing pages have shown the major tendencies of employment and the restraints which governments and economic leaders will have to face in the next few years. One of the essential components of our economic future, however, is the pattern and skills of manpower which form the second branch of this introduction.

Over the last 25 years, by virtue of a growing effort of vocational training and the experience acquired by workers in the firms themselves, the average level of skills has progressively risen, allowing the progress of industrialisation. Over the next decade the accumulated effects of the expansion of education will become evident; that means that the generations which will be coming on to the labour market, having had a much more advanced education, and having benefited while at school from some vocational preparation, will replace those who have acquired their qualifications by experience and work.

1. The development of education

The expansion of education was the subject of a conference held by the OECD in Paris in 1970. This conference afforded the opportunity for an analysis in great depth of all the aspects of education policies. It is enough here to outline the main conclusions.

In all OECD countries an increasingly large proportion of each age group is staying at school for longer and longer periods. The progress of enrolments is generally reflected in a faster development of secondary education than of primary education which already reaches almost the whole of the population; similarly, except in a few countries, higher and post-secondary education has developed faster than primary education.

The result of this educational expansion is that in most OECD countries the new generations leave the education system only after some ten years of schooling⁽¹⁾ and a growing proportion of young people will have a university or post-secondary certificate. As an illustration of this trend the educational level of the new generation of workers in Japan in 1954 and 1965 may be cited.

¹⁾ In several countries compulsory schooling has already been extended to 12 years.

Table 4

ENROLMENT RATIOS AT EACH LEVEL OF EDUCATION
(averages 1951-55, 1956-60 and 1961-65)

	1st level			2nd level			3rd level		
	Average 1951-55	Average 1956-60	Average 1961-65	Average 1951-55	Average 1956-60	Average 1961-65	Average 1951-55	Average 1956-60	Average 1961-65
	% of corresponding age group								
Germany	689	678	681	387	411	438	42.0	58.0	75.2
Austria	802	795	815	215	261	284	40.4	66.8	83.0
Belgium	947	944	957	339	391	439	54.6	80.0	127
France	1,011	954	915	231	297	369	63.6	86.2	145
Luxembourg	868	855	875	251	260	255	66.8	92.8	123
Netherlands	868	823	811	377	447	477	53.6	64.6	72.4
Switzerland	...	...	...	...	...	...	47.4	64.0	99.0
Denmark	653	678	767	349	357	341	...	...	95.4
Finland	684	686	652	227	292	354	...	...	...
Ireland	868	862	831	316	332	402	...	...	...
Norway	702	716	684	253	297	367	...	...	...
United Kingdom	717	664	652	344	408	425	...	...	...
Sweden	667	705	782	209	234	251	57.2	77.4	109
Spain	607	629	631	89.6	120	178	55.2	75.6	112
Greece	705	693	688	...	212	...	33.6	44.0	60.6
Italy	691	714	700	...	231	...	24.4	32.6	73.4
Portugal	486	516	517	66.8	111	173	57.6	62.8	90.2
Turkey	334	372	452	39.8	71.4	96.8	22.2	29.2	44.6
Yugoslavia	593	693	768	73.2	100	147	13.0	22.2	35.0
Canada	892	902	906	189	231	297	35.6	58.4	113
United States	940	918	928	306	329	358	80.6	120	202
Japan	626	672	625	335	451	532	211	296	368
							64.6	78.2	102

Source: Conference on Policies for Educational Growth, Volume II:

"Educational Expansion in OECD Countries since 1950", by Daniel Flot, OECD, 1971.

In the United States since 1965 more than one student in five has a university degree.

This considerable progress in schooling corresponds to a political determination long expressed by governments; in practice it also meets economic as well as cultural objectives. The question then arises whether the higher level of education also represents a higher level of qualification.

The general improvement in the level of education is bound to make young people more capable of filling the functions offered to them by the economy. Nowadays they are more capable of understanding the operation of the equipment they have to use and the part they have to play in the production process; they are in a better position, especially on completing secondary education, to discharge elementary duties of co-ordination. Modern economic organisation however is much more complex and highly organised and even elementary co-ordination functions, even in the tertiary sector, call for a minimum of technical qualification which is certainly not afforded by general education.

Up to 1965 it is difficult to detect a very well-defined tendency at secondary level from a comparison of the respective growth of general education and technical education; in Table 5, out of 15 countries eight have a higher growth index for technical education than for general education. In fact for half of these countries this relatively higher growth merely makes up for a less favourable starting situation.

It is equally difficult to detect any precise evolution in the distribution of university students. Table 6 in fact shows that scientific studies have in general developed faster than other branches.

It must however be noted that in many countries for some years past technical and vocational education has been falling into a certain disfavour, the reasons for which are very diverse. It is certain that some ten years ago or so students and their

EDUCATION CERTIFICATES IN JAPAN

Year	Percentages		
	Primary	Secondary	Higher
1954	60	32	8
1968	25	61	14

families were greatly influenced in choosing their studies by the need to ensure a career, and even for the majority of the population by immediate anxiety to find jobs. With the rising standards of living these concerns have to some extent faded into the background to the point of leaving young people somewhat without guidance in the choice of their school career.

In the absence of an effective system of school and vocational selection and guidance, it is mainly the expectations of the parents in the matter of employment, their social aspirations and the structure and organisation of educational systems which have determined the choice of pupils. Now general education is often thought to be more noble and more likely to allow for social upgrading than technical and vocational education, whose image is linked with that of working class conditions and the difficulties of a craftsman's trade. It must also be recognised that for a long time technical education merely represented a subsidiary branch in which children were found from the more modest social classes and those who had been unable to follow general education, and in which the courses were closely directed towards acquiring a vocational skill to the detriment of human education. There are very few countries, which, like Italy, have been able to give their technical institutes such organisation and prestige that half the higher secondary certificate holders come from them.

In some countries this aversion from technical and vocational education and even from scientific studies has become so alarming that governments have tried to give them a fresh glamour and to direct the choice of pupils in this direction. Table 7 shows the distribution of pupils in the United Kingdom (it should be noted that from 1964 onwards the absolute numbers of science pupils are also falling).

This state of affairs is not peculiar to the United Kingdom; a study has shown the existence of similar trends in Germany and the Netherlands⁽¹⁾.

At the higher education level a certain dislike is however found for technical studies and engineer training which are developing more slowly or even falling in relative unimportance. Thus, in the United Kingdom between 1960 and 1966, whereas the number of science graduates increased by 55 per cent, the number of engineers

1) Changes in Subject Choices at School and University, by Celia Mary Phillips, University of London, May 1967.

Table 5

INCREASED ENROLMENTS IN GENERAL AND TECHNICAL EDUCATION
AND TEACHER TRAINING FROM 1951-55 to 1961-65

Index : 1951-55 = 100

	Growth indices			
	General	Technical	Teacher Training	Total Secondary
Germany	133	85	-	99
Austria	116	133	157	128
Belgium	127	210	169	157
Luxembourg	109	131	114	117
Netherlands	183	156	-	168
Denmark	105	133	263	121
Finland	215	215	85	213
Ireland	160	110	79	129
Norway	246	136	-	204
Sweden	122	321	81	153
Spain	252	134	202	213
Italy	184	262	163	196
Portugal	230	(315)	152	(264)
Turkey	354	245	245	320
Yugoslavia	180	228	134	205

Source : Conference on Policies for Educational Growth, Vol. II :
"Educational Expansion in OECD Countries since 1950", by
Daniel Blot, OECD, 1971.

increased by 27 per cent only, with the result that employers have found themselves obliged to recruit scientists to do engineering jobs(1). Even in Italy where the training and functions of engineers retain very great prestige (nearly 19 per cent of students prefer engineering faculties compared with 10 per cent science faculties)(2) a fall in the relative share of technical studies has been noted since 1960.

It is true that the entry conditions for higher technical education establishments are generally more restricted than for pure science faculties, and studies generally last longer(3). These two factors are certainly not without influence in the

1) The Flow into Employment of Scientists, Engineers and Technologists, (The Swann Report), HMSO, 1968.

2) Inchiesta Shell No. 8, "La Scelta della Facoltà universitaria".

3) The trends noted for instance in Spain are attributable to the reforms of the higher-education system.

Table 6

INCREASED ENROLMENTS IN VARIOUS BRANCHES OF UNIVERSITY
EDUCATION FROM 1951-55 to 1961-65(a)

Basis 1951-55 = 100

	Growth Indices			
	Science (b)	Medicine	Others (b)	Total University
Germany	177	242	210	202
Belgium	197	140	186	175
France	265	140	203	207
Netherlands	200	117	212	184
Switzerland	191	124	197	178
Denmark	196	179	211	198
Ireland	193	114	190	172
Norway	281	149	281	260
Sweden	262	172	304	269
Spain	201	114	144	148
Greece	...	...	...	(270)
Italy	143	78	187	154
Portugal	186	104	223	182
Turkey	275	173	248	240
Yugoslavia	218	155	207	203

a) This table does not include enrolments in non-university higher education.

b) - Science: pure science, architecture, technology, agriculture.
- Others: humanities, fine arts, education, law, social sciences.

Source: Op. cit., Volume II of the Conference on Policies for Educational Growth.

choice of young people, but it must be recognised that engineer training at the various stages requires very sound basic knowledge and fairly thorough study of applied science, and that the requirements of education establishments are not unreasonable.

One of the main reasons which decide young people to go in for more general education rather than vocational education lies in the structure of the education system which has evolved more slowly than the needs and aspirations of the young generation. One thinks, for example, of the character of university education, formerly reserved for an élite, and which today caters for a substantial fraction of each age group. Admission procedures, working methods and even the whole object of courses should have been reviewed at the proper time.

Table 7

PROPORTION OF PUPILS IN TERMINAL SECONDARY CLASSES, BY SPECIALITY - UNITED KINGDOM

	Real							Estimated			
	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	
Scientific group	41.5	39.6	37.5	35.3	33.8	31.4	29.5	27.5	25.5	23.5	
Non-scientific group	48.6	50.0	51.0	51.5	52.5	52.8	54.0	54.8	55.6	56.4	
Mixed group	9.8	10.4	11.6	13.1	13.7	15.8	16.5	17.7	18.9	20.1	
Total.....	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	

Source: "Enquiry into the Flow of Candidates in Science and Technology into Higher Education",
The Dainton Report, 1968.

The Swann Report emphasizes in particular - and the same remarks have been made in the United States(1) - the need to modify the approach to doctorate studies (Ph.D.) which should contribute to a fairly broad higher education, outward-looking to the business world rather than confining the horizon of students to specialised research within the academic world. The same report recommends that the undergraduate years should be less highly specialised and should give students a better preparation for their successive functions in working life(2).

Great efforts have been made in Member countries to bring education and culture within the reach of the largest possible numbers both at compulsory and at higher secondary and university levels. But these reforms have often been introduced at the cost of vocational education, either because they have confirmed the pre-eminence of education in the humanities or because they have postponed vocational training to an age when it scarcely has any more attraction.

In this connection the case can be cited of the Italian vocational institutes responsible for vocational training within the schools system: these institutes which form one branch of the second secondary cycle are not very popular with young people, who prefer to start working and to take an accelerated training course in a centre coming under the Minister of Labour or to start studies as a technician(3).

Similarly, few young people on leaving higher secondary education are tempted to attend short terminal education, that is to say, strictly vocational education; they prefer to start a university career even at the cost of having to give up their studies later. This is particularly striking in countries where long and short education are developing in parallel, that is to say, mainly the Western European Countries.

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- 1) Cf. Science and Engineering Doctorate Supply and Utilisation, NSF, United States, May 1971.
 - 2) Dr. Bosworth, Personnel Director of English Electric Co., has set up "matching sections" to introduce young graduates to industrial needs.
 - 3) See Reviews of National Policies for Education - Italy, OECD, 1969.

Table 8
PROPORTION OF ENROLMENTS IN TECHNOLOGY

Country	Percentage of total enrolments			
	1950-51	1955-56	1960-61	1965-66
Yugoslavia	19.5	17.8	21.9	23.1
Portugal	24.9	20.6	19.5	20.1
Austria	..	22.0	23.8	19.5
Japan(1)	13.3	13.3	15.4	19.5
United Kingdom(2)	12.4	15.6	18.5	19.2
Spain(3)	4.0	5.4	8.5	18.9
Netherlands	11.5	15.5	17.8	16.1
Finland	15.3	12.0	9.4	10.1
Germany	13.9	17.7	16.9	13.5
Norway	12.7	20.8	17.6	12.4
Italy	13.1	11.7	11.4	11.1
Sweden	16.8	15.2	14.4	11.9
Belgium	12.9	11.3	12.6	10.7
Switzerland	12.3	12.4	13.1	11.0
Denmark	12.6	13.9	13.3	10.2
Turkey	5.3	5.7	5.4	7.6
Ireland	8.6	9.4	6.5	7.4
Canada(4)	..	16.2	13.6	8.8
United States	12.7	8.8	9.5	7.1
Greece	..	6.2	7.4	6.5

1) Includes students enrolled in pure science.

2) In 1965-1966, the former Colleges of Advanced Technology were upgraded to Universities.

3) Not including preparatory courses for Higher Technical Schools.

4) Full-time students.

Source : Development of Higher Education 1950-1967, Analytical Report, OECD, 1971.

2. The spirit of education

Social aspirations and the organisation of the education system, however, are not the only factors in the choice of a school career. It must also be recognised that there is a change of outlook, the extent of which is likely to change with increased schooling. This change has two characteristics:

- increased enrolments have brought into the second secondary cycle and higher education a large proportion of young people who have no very clear idea of their future school and vocational career, of the resources offered by the education system or of the employment situation. These young people, who as a result of rising standards of living are not constrained to find an immediate job, are somewhat at sea in their choice and make up their minds rather in the light of the prevailing interests in their school or university environment than of their aptitudes or employment possibilities;
- Special reference must be made to the traditional tendency of teachers, particularly university teachers, to disregard concrete problems and to cling to abstract disciplines, both in the humanities and in the sciences.

Students are very ready to turn to studies with little relation to working life and prefer theoretical training. It is interesting to emphasize in this connection the dislike of engineering students for mechanical engineering, which nevertheless offers great employment possibilities. Table 9 shows, from figures which are already out of date, the trend of choice in the United States; the same is true in Europe, sometimes more accentuated.

We are in fact witnessing an extension of the influence of the university spirit, either through the medium of secondary education, whose teachers come from the university, or directly through the democratisation of higher education. Now this spirit is not the right one for mass education, neither is it adapted to the industrial world. It can only be noted that whatever value is attached to this traditional spirit, the expansion of education and progress of enrolments have not been very favourable either to the acquisition of qualifications, or to industrial progress⁽¹⁾.

¹⁾ La formation professionnelle pendant le VIe Plan, Rapport général, Paris, March 1971.

Table 9

ENGINEERING GRADUATES BY SPECIALITY - UNITED STATES
(1950-1963)

Years	Total	Total columns 4-9	Elect. (4)	Mec. (5)	Civil (6)	Chem. (7)	Ind. (8)	Aero. (9)	Percentages	
									Others (10)	
1949-50	100	85.0	25.2	27.2	14.7	8.6	6.4	2.9	15.0	
1950-51	100	83.1	22.4	25.7	16.9	9.0	6.2	3.0	16.9	
1951-52	100	82.0	21.0	25.1	17.7	9.4	6.0	2.7	18.0	
1952-53	100	81.4	20.3	24.5	18.2	9.4	6.3	2.7	18.6	
1953-54	100	80.5	20.2	24.4	17.8	9.2	6.0	3.0	19.5	
1954-55	100	83.1	21.5	26.0	17.1	9.0	6.4	3.0	16.9	
1955-56	100	84.3	23.7	25.6	16.1	9.4	6.3	3.4	15.7	
1956-57	100	85.1	26.0	25.3	15.0	9.0	6.2	3.6	14.9	
1957-58	100	85.5	27.1	25.6	14.5	8.5	6.0	3.8	14.5	
1958-59	100	85.9	28.3	25.2	14.1	8.2	6.0	4.1	14.1	
1959-60	100	85.8	28.1	25.4	14.0	7.8	5.9	4.5	14.2	
1960-61	100	85.9	28.4	24.1	14.9	8.0	5.8	4.6	14.1	
1961-62	100	86.2	29.5	24.4	14.9	7.7	5.5	4.1	13.8	
1962-63	100	86.0	31.1	23.0	14.3	8.1	5.6	3.9	14.0	

Source: Engineering Degrees, 1962, 63 and Enrollments, Fall 1963, Washington -
U.S. Department of Health, Education and Welfare, p.9.

Cited by R. McKay, Preparation, Mobility and Utilization of Engineers,
Ohio State University, 1969.

3. Men at Work

The increase in enrolments will bring on to the labour market young people with a higher standard of education and even higher vocational diplomas than their predecessors. No doubt the pattern of employment in modern industrial society has considerably changed, but the fact nevertheless remains that the functions available for a given level of qualifications will be much less prestigious than they were in the past; engineers will find themselves assigned to junior technical duties and not to the management functions to which their predecessors could aspire; secondary school certificate holders will be no more than office or factory workers in so far as they are qualified for the job. In other words, a lot of people will feel themselves over-qualified or under-employed.

The least favoured groups will have had some secondary education and most of them a second-cycle secondary education. These young people, whose education has sheltered them from the business world(1), will have little taste for working class status or jobs as salesmen or clerks, just as university graduates will hardly be attracted by the colourless jobs offered to them. These attitudes, which are already responsible for alarming unemployment in the United States, reinforced by an education little adapted to modern society, are scarcely favourable to integration or vocational success.

At the same time the productive mechanism has evolved. In the old days it was the satisfaction of a good job of work, the identification of the individual with the firm - in the case of managers and supervisors - and financial necessity which attached a man to his calling. Today, a man scarcely sees the results of his labour and many activities relate purely to immaterial services. Business firms and the productive mechanism have become so complex that men have difficulty in seeing their own place in them, and participation seems to have become an abstract concept. Finally, the level of development and social organisation have considerably weakened financial restraints.

These reasons combine radically to change men's attitude to work. This change doubtless has some happy results; assured of a decent standard of living, men can undertake careers which are

1) The effort being made in Germany to initiate pupils to working life is worth noting and should prevent the consequences of this isolation (Arbeitslehre).

perhaps less remunerative, but more suitable for personal development or a better use of their aptitudes. Unfortunately, other defects are also to be feared, which are likely to become a powerful inhibition on economic growth.

These adverse effects have already manifested themselves in the university, where student unrest is no doubt connected with their anxiety about their working future. A certain unrest, however, is also apparent among young graduates; employers note signs of a frustration and great instability among young people who hope for more responsible jobs and faster advancement⁽¹⁾. Furthermore, in the lower levels of the hierarchy absenteeism is developing appreciably.

Frugality, assiduous work, punctuality and interest have been the conditions of economic development. But industrialisation has led to mass consumption and as a result, labour and the accumulation of wealth are no longer ends in themselves, but a means of attaining consumption. As Dr. H. Matthews has said, "In a credit card society, work is the punishment for having enjoyed oneself, rather than the pre-requisite for doing so".

This directly affects the ethics of work. A motor insurance firm says that the current absenteeism rate has risen from 2.5 to 5 per cent. This rate is commonly 10 per cent on Friday unless the staff are paid on Thursday, when it reaches 20 to 25 per cent on Friday (Industry Week, 1970). This tendency is repeated in many Western countries (Science Journal, U.K., April, 1970). At executive level, this tendency is reflected mainly in lack of interest in the work and results of the firm; personal commitment is limited to the exchange of labour for salary.

The foregoing remarks are enough to show how different the men available to the economy in the 1970s will be from those who ensured the progress of industrialisation, and the prospective evolution of the difficulties which governments and industrialists will have to face. The main difficulty arises out of this combination between the higher level of education, the attitude of men towards work and the transformation of the whole concept of work.

1) Education and Jobs: the Great Training Robbery, by Ivar Berg (Columbia Press, 1970).

Chapter II

FUNCTIONS AND QUALIFICATIONS

The use made of human resources can best be assessed by comparing functions with qualifications. Functions can be fairly well defined at enterprise level, at any rate at the moment of recruitment, but this definition loses much of its value for anyone who is a stranger to the context in which it has been formulated, and therefore hardly lends itself to aggregation. Qualifications, for their part, can really be defined only after the event, in the light of results achieved; the most one can do is to speak of the ability to produce a concrete result in a technical or functional field. This ability cannot in any event be reduced to terms of academic honours obtained; account must also be taken of practical experience, real know-how and personal attitudes.

It is clear that the statistics at present available are far from taking anything like strict account of functions and qualifications. The classifications and nomenclatures used, often established under the influence of some particular preoccupation, and lacking uniformity, should have evolved in harmony with the real world they are intended to describe. In various countries, and even at ILO itself, the need has been felt to adapt them so as to deal with new problems; it is to be hoped that when this updating is decided upon, criteria will be adopted which lend themselves to economic analysis.

A. QUANTITATIVE AND QUALITATIVE DISEQUILIBRIUM

The most elementary, and not the least instructive, aspect of this comparison of functions and qualifications is certainly the classical analysis of supply and demand, which can be perfected and made more significant if it is completed by qualitative observations.

Governments are already having to face these imbalances, whose social repercussions are considerable. Up to now unemployment has mainly affected the work-people, and it was also at this level that manpower migrations were found. Today it is young graduates, scientists and experienced executives who find themselves out of work or have to compete with foreigners. It is probable that these imbalances will become even more accentuated in the next ten years, except perhaps in those countries whose growth, and particularly their industrial growth, guarantees a growing demand for qualifications; even in these countries the qualitative problems remain and their social impact will be more seriously felt than their economic impact.

1. The causes of disequilibrium

The foreseeable evolution of activities and of human resources has been considered in Chapter I: their comparison indicates the causes of disequilibrium, which can be grouped under the following heads:

- Economic changes

The pace of economic change, and the small proportion of executives in the productive mechanism, have so far enabled them, without too much difficulty, to find a new job when they found themselves out of work(1). But while this absorption has so far been possible, it is unlikely to continue; the social policy of adjustment would have to be transformed into an active policy of adaptation and mobility.

It is important to stress that it will not necessarily be the conventional industries and the work-people who will be most affected by changes in the next few years. This adaptation policy therefore implies a reappraisal of the recruitment and career policies of employers - especially of the State - the definition of a clear policy of complementary in-career training, and an objective examination of the functioning of the labour market for qualified personnel.

- Government policies

One of the characteristics of the trend of employment is the development of non-profit organisations and services in the functioning of which the State, directly or indirectly, plays a

1) Except in France and the United Kingdom.

large part. In the United States such organisations employ more than half the work force. A budget restriction or an administrative decision may throw thousands of qualified executives out of work, or at least interrupt their career and cut their emoluments.

At the present moment this affects mainly military and aerospace research expenditure. In the United States, half the engineers and technicians were thus working directly or indirectly for the State(1); it is easy to understand the consequences for employment of a slowdown in space programmes. The incidence of a government decision is, however, no less in the European countries whether it is a question of acquiring a strategic strike force or perfecting a supersonic aircraft.

The role of the State is perhaps more important in the matter of employment than in that of economic change. For economic change, the intensification of competition, the future of each sector of industry, are to some extent foreseeable, and changes are not instantaneous, whereas the swing of the majority from one side to the other, a change in policy guidelines, may be.

This circumstance is aggravated by the very nature of the activities or industrial projects encouraged by the State, which are always highly specialised and technologically advanced and which are not always clearly related to a manifest need of society, so that budget restrictions may throw on to the labour market extremely highly qualified executives, but who could hardly be employed elsewhere at their level and in their speciality.

- Employer's policy

The big industrial enterprises generally establish their own recruitment and career practices in the light of the needs of the moment. As and when a young executive gained experience - and as and when the enterprise expanded - he was offered new responsibilities which enabled him to climb the rungs of the hierarchy one by one. The needs for technicians and managers at the same time stimulated great efforts at internal promotion; in France,

1) This had already been noted by the Killian Report, Towards a Better Utilisation of Scientific and Engineering Talent, Washington, D.C., 1964.

in the motor manufacturing industry, the percentage of self-taught engineers and senior executives rose from 48 per cent in 1956 to 59 per cent in 1962(1).

It may be feared that such favourable circumstances may not continue in future years, as certain signs already indicate. In fact:

- some enterprises recruit young graduates, especially engineers, with the sole intention of making immediate use of their qualifications, without concern for the careers open to them after the four or five years during which they will have been turned to profit. This is all the more serious since the functions are often highly scientific and therefore attract the best products of present higher education.
- forecast personnel management is not yet very widespread and it is only quite recently that enterprises have felt the need for a great effort of renewal in this field. In practice, career patterns have up to now depended more on the needs of the moment and on personal ambitions than on a predetermined plan. Under this system, the best or the most astute men actually get the jobs which suit them; the rest find themselves with jobs for which they are ill-prepared or for which they have little taste; they are misused, they find their qualifications and their drive deteriorating, so that in the event of staff reductions, they find themselves unemployed, with little hope of finding another job.
- it is clear, in the light of keener international competition, that systems based on loyalty to the employer and promotion by length of service, can lead only to deadlock. This mathematical certainty, however, has failed to materialise in some countries, such as Germany and Japan, where the expansion of enterprises and the diversification of their activities have so far made it possible to avoid the difficulty; it is to be hoped that this state of affairs may be lasting(2).

1) Union des industries métallurgiques et minières : Les ingénieurs et cadres supérieurs des industries des métaux.

2) This remark may be regarded as an extension of A. Sauvy's theory of balanced growth applied to employment.

- another cause of disequilibrium lies in the competition among young graduates, technicians and internally promoted executives, which will not necessarily operate in favour of the graduates.
- finally, it must be borne in mind that the economy is not solely a complex of big industrial enterprises, but that the policies followed in the services sector and particularly in the various general government agencies, and the employment facilities accorded to small enterprises are quite as decisive overall and generate quite as many imbalances which, though they may be less visible, may perhaps be felt all the more acutely.

- Technical changes

The causes connected with technical change must be distinguished from those connected with economic change. We shall consider here the precise technical changes which throw specific categories of personnel on to the market. They have a smaller immediate effect on employment than is generally thought.

It seems in most cases that personnel policies - or a national adaptation policy for everything relating to smaller firms - could have avoided or attenuated the disequilibrium caused by the introduction of new equipment; in general, technical change affects personnel who already have technical training and who can therefore acquire new knowledge, or even who are on the point of changing their job following their normal career pattern(1).

- The development of education

It has been shown in the previous chapter that the expansion of education has not been in the direction of better vocational training but that, on the contrary, parents and pupils have gone in for education with little relation to their working futures; and further that the outlook acquired in secondary or higher education scarcely inclines them to do the jobs which might be available for them.

It must be emphasized that these comments are made on the basis of past statistics and that we are not yet informed of the

1) The report by Norgren and Warner, Obsolescence and Updating of Engineers' and Scientists' Skills (MDTA 15-6, 4th November, 1966) shows that in the most advanced technological firms in the United States (aerospace and avionics) about 25 per cent of the engineers and scientists working on research and development imperatively needed to have their knowledge updated.

consequences of existing expansion and democratisation of education on the employment situation.

It is already found that young people leaving general secondary education especially in the United States where democratisation is most advanced⁽¹⁾ spurn jobs as labourers or semi-skilled workers. In Europe, university education is often regarded as an insurance against subordinate employment and particularly against a job in a production department.

The result is that employers, particularly in the industrial sector, have the greatest difficulty in finding personnel, especially at intermediate and junior level, with the result that they are faced with a number of alternatives:

- to resort to foreign labour, generally unqualified but anxious to work to improve their conditions. This alternative is already general in regions which have been industrialised for a long time, to the point of creating social and political problems. About one quarter of the workers in the Province of Liège are foreigners;
- to install their enterprises in regions where labour is more abundant and cheaper. According to the nature of the production the choice will fall upon rural regions in the process of urbanisation (workers with little skill) or undeveloped regions which have had a high school enrolment ratio, for example for aircraft building;
- a third alternative which attracts more and more industrialists is to set up abroad in the less developed countries, or better still to sub-contract manufacture to foreign firms, thus eliminating all worries about labour, production and depreciation. The example can be cited of the policy of computer companies for the manufacture of various components.

These tendencies are scarcely favourable to the development of employment in industrialised regions; not all industrial firms have these possibilities and those which do not are therefore very anxious about their future.

In order partly to offset this disequilibrium it would be necessary for students who go on to secondary or even higher studies in branches of education which do not confer a genuine

1) The American worker has, on average, attended school for 12.3 years.

educational qualification or confer a qualification which only a very few students can really regard as such, for example in sociology - to accept the view that, in spite of the higher level of education which they have desired to acquire for personal reasons, they find themselves at the same level vocationally as those who have completed compulsory education only and must be ready to do the same job, at any rate for a start. If this is still possible in the United States it is hardly conceivable in Europe and still less in the underdeveloped countries.

When one looks at these various causes of disequilibrium one finds that it is not unskilled workers and labourers who will suffer most from fluctuations in employment, but engineers, technicians, middle executives and managers. We are in fact witnessing a mutation of society resulting from economic progress and the expansion of education; the holders of the highest university degrees find themselves assigned in the best cases to purely operational duties without any responsibility; at the same time semi-skilled workers in the Renault factories in France are rebelling against the impossibility of making a career and an increasing number of those turned out by the education system profess their unwillingness to devote themselves to other occupations than those which would formerly have been regarded as leisure.

2. The foreseeable disequilibrium

The causes of disequilibrium are therefore manifold and the foregoing rapid review may lead to a somewhat pessimistic overall assessment. In fact it must be taken that the present employment situation is not particularly favourable, as emphasized in Section 1, and that a large part of the population is scarcely adapted to the duties it is called upon to discharge. The future will therefore probably be no worse than the present; our aim is to identify and if possible to forestall the most serious crises and to make the best use of the qualifications actually available.

From this point of view, it may be taken that the tendencies which threaten the balance of employment in the 1970s are already manifest by some sign or another in Member countries. Nevertheless, as pointed out, some of them have escaped these difficulties for historical, social, economic or other reasons; this does not mean that they will not emerge in the near future and their governments should keep a close watch on the trend of the employment situation in other countries.

If therefore, we desire to limit ourselves to the main categories of personnel who should be the subject of specific medium term programmes on the part of governments we must cite the following:

- unskilled labour, which is not the main subject of this study, but the shortage of which has repercussions on the employment of other categories, on the migrations of workers and on the choice of a location by employers. This is at present the main preoccupation of employers and employment policy-makers.
- young secondary or higher education certificate holders, many of whom have practically no vocational preparation or qualification. It must be noted in this connection that difficulties of employment have not yet made their appearance in some countries for the sole reason that the democratisation of this type of education is still fairly recent and that the generations which have benefited from it have not yet come on to the labour market.

In practice, these young people can be divided into various categories (disregarding here the case of handicapped or backward children):

- secondary school leavers, who can still be given vocational training and qualification. Education authorities are at present studying the most suitable forms of post-secondary education to give them effective training; these programmes are sometimes launched on the initiative of industry or employers' confederations and sometimes by the local authorities (community colleges in the United States).
- university graduates with no occupational preparation who are much older and therefore less malleable and less receptive to complementary vocational training. Various initiatives have already been taken, for example at Grenoble (France)(1) for graduates in the humanities; it is however difficult to judge, on the basis of the results of these initiatives, the effectiveness which may be

1) Professor Page, Faculty of Law and Economics of Grenoble, Research Centre on the Economics of Education, Enquiry into the Adaptation of Training to Employment, 1969.

expected at national level with students who have not yet felt any genuine motivation in favour of this complementary training which for them represents a veritable conversion. More accurately, the repulsion which they feel for activities whose intellectual content is apparently far below what they are accustomed to may be just as powerful as the need to find a stable job.

It is probable that this will be the major political problem in the next ten years. If it has not yet made its appearance in full strength, it is because the economy has so far been able to absorb a surplus of graduates, especially in the services sector, without greatly suffering overall, thanks to a certain elasticity. But also perhaps, not enough questions have yet been asked on the use of human resources; such a consideration might lead to the following comments:

- a growing number(1) of graduates turn to activities with a very low productivity, whose utility for the economy and society is not very clear. We are in fact witnessing a proliferation of institutions for research services, study, etc., whose objectives are sometimes somewhat confused and whose management is uncertain, their main interest being to afford a refuge for graduates. It is certain that the urgent need of personnel to implement social policy - to develop hospitals, to create new municipal services, to render operational assistance to less developed countries - would justify a different use of these graduates.
- it is true that the inflow of graduates into the tertiary sector, by a sort of induced effect, causes a growth in the demand for services, such as information, culture, statistics, etc.(2). This induced effect cannot be criticised in itself. It must however be admitted that this expansion can be challenged in the same way and on the same grounds that space programmes or supersonic aircraft programmes have been challenged.

1) Except in Japan, where industrial expansion is creating such a demand that graduates today turn more to the secondary sector.

2) The considerable growth in intellectual production has inspired Pierre Piganiol with the fear of "Mental Pollution".

The long, and perhaps the medium-term, answer to the situation no doubt lies in a transformation of higher education, a transformation in structure but above all a transformation in outlook. In the short-term, salvage programmes should be introduced similar to those which some countries have set up for the benefit of older executives.

- a) University graduates with a vocational training who cannot find a job in their own branch. Leaving aside cyclical causes, of the type recently underlined by the Confederation of British Industries, conversions are necessary which will be all the more difficult the more specialised the studies pursued, as was emphasized, also in the United Kingdom, by the Swann Report. It is not thought that this type of problem will attain political dimensions in the near future unless it is combined with other circumstances (such as a cut in expenditure in space or military research or major bankruptcies in a sector of the economy) in which case priority of employment will generally be given to executives already employed, in spite of the lower salaries paid to young graduates.
- b) The lack of technicians in most countries remains a constant concern of those responsible for the economy and of employers. Some countries such as Germany have benefited and still benefit from highly qualified personnel at the technician and highly skilled worker level; in most other countries, the training of technicians was less highly regarded than general secondary education or even practically non-existent; in addition educational reforms are tending progressively to raise the level of this training, as in Spain, or to convert it into a costly means of access to the university as is to be feared in Italy.

It is nevertheless at this middle level that the needs are and will be greatest, with the result that unqualified personnel will have to be over-used or those with university vocational education under-used.
- c) Older executives create a more important political problem, because of its social repercussions. Public opinion often attributes their employment difficulties to the obsolescence of their technical knowledge; this

is in fact only rarely the case, and this point merits a few comments:

- The Norgren and Warner report already cited indicates that in the research and development departments of the technologically most advanced enterprises only a quarter of the engineers and scientists really need technical updating. In practice some of these engineers regularly go in to the production department to carry out projects in the conception of which they have taken part; others, by a normal career pattern, go on to commercial or management functions. These executives are also in general fairly young.
- In practice the origin of employment difficulties lies rather in the conception of careers and the non-specific character of the duties assigned to executives in the course of their careers. If it is accepted, for example, that ten per cent of the executives of an enterprise thus lose their drive without acquiring a genuine functional qualification and if into the bargain, following a concentration or a recession in a particular sector their technical qualifications or market knowledge become valueless, it is practically impossible for them to find a new job.

The unemployment of older executives may therefore be attributed to the following factors:

- the selective character of the present career system which may perhaps benefit the most brilliant individuals but which condemns to routine activity an excessive number of people whose abilities are under-utilised and who have become inadapttable.
- the lack of mobility of personnel, the impermeability of enterprises to new methods and ideas, which not only may put them in an unfavourable position in relation to competition, but which also contributes to a fall in creativeness.
- the effect of these two factors is aggravated by the salary scale, which is not sufficiently connected with the effective economic return on each individual. This is not necessarily a criticism of the system of higher remuneration with advancing age, but of the

insufficient attention paid by employers to making the most of the possibilities of each individual by complementary training or appropriate personnel management.

- d) Highly specialised engineers and researchers have become fairly vulnerable. This was a category of personnel which was still relatively rare just after the Second World War; but the expansion of education and the character of university training, which quite naturally leads to activities of research and conception and the prestige attached to these activities, have attracted a relatively large number of young people to them. Now for various reasons these people are not very adaptable:

- In some countries the relevant training is or has been extremely specialised, with the result that conversion is not backed by sufficient basic general scientific and technical culture.
- An engineering career normally starts from a design office and goes on to production and administrative and commercial duties. Research proper is not normally the starting point of such a stream, especially in university circles, with the result that researchers are to some extent prisoners of their specialisation.
- The structure and organisation of research are somewhat remote, materially and intellectually, from the world of production. Working methods and retirement schemes are so different as to make it even difficult to transfer from university research to industrial research(1).

Now, recent experience has shown the decisive importance of government research and development programmes and contracts and the harsh consequences of international competition (for example, aeronautical research). It has become imperative for governments to impose enough planning and co-operation to avoid tens of thousands of skilled workers being reduced to unemployment(2).

- 1) This problem was brought out by the Lasry Report of the French Delegation for Scientific and Technical Research (DGRST).
- 2) Cf. Killian Report, op. cit.

It is difficult to foresee for the whole of the OECD countries the imbalances which may result from the international migration of qualified personnel. An important OECD study(1) has shown the existence of zones of attraction and zones of repulsion, affecting well defined categories of personnel; a similar forecast on a national basis would make it possible to reach more specific conclusions.

It is, however, not unimportant to make it clear that migrants usually have a well defined technical qualification and functional characteristics; this is the case of researchers, who have been attracted to the United States by the development of research programmes and the conditions from which they can benefit there. A close examination should make it possible to identify the decisive causes of these migrations and, where appropriate, to remedy them. If Greece or Norway train too many top specialists in information sciences, these specialists will probably leave for a country which can employ them at their own level, at any rate for a few years; if English doctors are attracted by the income they can earn in the United States, they will be replaced in their own country by immigrants(2).

What should be clearly understood is that future migrations will not only be those of workers and top scientists, but also of technicians and engineers whose numbers have been multiplied in all countries by the expansion of education. It is not out of the question that the pattern of output of the education system which we considered above may mean that this feature becomes fairly widespread, for example, at the intermediate and technical level, where it is becoming increasingly difficult to find staff, and where as a result, situations of attractions arise.

B. THE UTILISATION OF AVAILABLE QUALIFICATIONS

The first stage in this comparison of jobs and qualifications has brought out, by a rapid contrast between supply and demand, imbalances which have already assumed disturbing dimensions in some Member countries. It is clear that these disequilibria are the outward signs of a more general lack of

1) The International Movement of Scientists and Engineers, by Y. Fabian, OECD, 1969.

2) This became evident during a hospital strike in London.

adaptation between jobs and qualifications; the unemployment of older executives or young graduates, the shortage of technicians, the inflow of foreign workers, disclose a weakness and lack of adaptation in the productive mechanism which is perhaps even more serious for the economy and for society.

How can we determine the causes of this weakness in the economic organisation? At what level must the analysis be located in order to arrive at a diagnosis? On the basis of the observations which can be assembled, how can we define the instruments of a national policy and the criteria for their effectiveness? These are the questions which must be answered if it is desired to make a better use of available qualifications.

1. The criteria of utilisation

The whole concept of utilisation already raises a set of fundamental problems to which people are today inclined to give a political dimension, namely the purpose of work and the subordination of men to the economic structure. It is obviously attractive to give personal development and the blossoming of man priority over the material objectives of prosperity; in fact, such a policy presupposes sufficient economic prosperity and the role of Government remains to judge how far national resources allow it to be undertaken.

If post-industrial society desires to ensure the continuity of economic expansion and rising standards of living it must make productive structures more flexible so that men can integrate themselves in them; the fact nevertheless remains that men must make a major effort to adapt themselves and to participate in the collective effort.

From this point of view, how can the criteria of utilisation be defined? Should these criteria relate to an economic objective, or to the man? Should super-numerary sociology graduates be given the opportunity of acquiring a practical qualification, or should each firm be compelled to create sociological posts, as was done for the benefit of war-disabled? It is quite clear that the second alternative would hardly be feasible, although it is not without its partisans. The solution seems to be imposed by demand and furthermore the resulting compromise between economic objectives and social objectives at the same time corresponds to fairly sound criteria for the use of available qualifications.

The problem of the utilisation of men is no new one; the development of large-scale public services and industrialisation have led to the setting up of functional structures; the need immediately appears to direct and co-ordinate the activity of executives, technicians and managers. The first efforts of the organisers, however, were directed towards the use of operative manpower, the arrangement of the work station, the layout of the workshop⁽¹⁾; the result was a fairly rigid and static conception of organisation which left little initiative or judgement to the workman.

In the modern conception of organisation, even when it is addressed to operative manpower, account is taken of individual behaviour and every effort is made to leave everyone a certain margin of initiative; productivity is thereby increased. This evolution would, in any event, have become necessary; better educated workers would certainly refuse purely repetitive tasks which their parents were being constrained to accept. It is, however, difficult to conceive that, in a society which professes to place the economy at the service of man, such tasks can be perpetuated where it becomes possible to have them done by a machine, even if that machine is sometimes more costly.

Industrial development and technical progress confer increasing importance on the utilisation of executives and managers, who at the same time represent an increasing proportion of employment. Now the diversity of functions and complexity of qualifications make it more and more difficult to apply the old principle "the right man in the right place"; other productive organisation and other combinations of qualifications are feasible so that it is impossible to refer to a too rigid organisation scheme but rather to general management principles.

a) The use of specific knowledge

The use of technical or functional knowledge is obviously the first criterion which leaps to mind; it is also the first principle of traditional management. In the modern context, however, its application calls for the following comment:

1) One might except Administration industrielle et générale, by H. Fayol, Paris, 1916.

- This principle of using knowledge implicitly refers to the scarcity of qualifications. Thus, in countries which are still little developed, where there are only a few skilled workers or technicians, it is obvious that the best use is to employ them in the functions for which they have been trained; it is this implicit judgement which justifies the idea of investing in education.

This criterion of relevance, or matching training and functions, has been referred to in the context of American science policy; a few top specialists were available who had to be distributed and used with a view to the successive achievement of the objectives of research programmes. It was, moreover, in this context that the concept of utilisation originated.

- Nowadays we find ourselves rather in a situation of abundance, particularly in specialities such as chemistry or electronics. In order to fill the specific post or make up a team, attention should be paid not only to technical knowledge⁽¹⁾ but also to other criteria such as training for specific duties; this is, moreover, a common method of selection.

In a situation of abundance it appears that possession of specific knowledge is no more than a factor of preference which is not always the one to which the greatest priority is attached, and knowledge therefore remains unused or apparently under-used. In practice, the only case where a criterion of relevance can be adopted are those of duties which can be called precisely for that reason elementary duties such as those of an operative, a novice engineer, a pilot or a researcher who could in any event not do anything else. The field represented by these "elementary" functions is relatively restricted; it is however more developed in the United States than in other Member countries, maybe because the United States have believed in specialisation or because the organisation of production is perhaps more advanced there.

1) "Technical" knowledge includes that of the engineer as well as that of the financier or the doctor.

- The relative scarcity of functional qualifications may perhaps lead to their being given priority in the recruitment of executives and managers. This may lead to the use of engineers as commercial executives and people with low technical qualifications in charge of production sectors; these are not necessarily instances of misuse.
- The relativity of this idea of knowledge must be stressed; as soon as one leaves design offices and research laboratories, unused knowledge is soon forgotten. In exchange people who have had a sufficiently wide basic training and who have retained enough intellectual activity are capable of astonishing assimilation of new knowledge in fields which are foreign to them. The result is that the criterion of the use of knowledge is too rigid and too absolute to be applicable to modern industrial society, and even more so when the idea of knowledge is assimilated to that of basic scholastic training.

b) The use of aptitudes

Knowledge is merely the medium or instrument of human activity. In practice, everyone uses his knowledge according to his career circumstances, his working environment and his personal temperament. Some people are more gifted for research and reflection, others for command and human relations etc. Now the productive mechanism affords employment for all these different temperaments but it is still necessary to identify them and give them their full value. It is at this price that the best performance will be obtained and that at the same time the greatest vocational satisfaction will be afforded; it may even be emphasized that the fact of allowing the vocational fulfillment of the personnel will be an essential factor in drive and productivity.

The use of aptitudes is therefore seen to be an essential factor in the development of the enterprise and economic development. But while the use of technical and functional knowledge may be based on fairly precise organisation schemes, the use of aptitudes calls for a more empirical policy.

- The aptitudes of personnel will not be disclosed unless they are given the possibility of manifesting themselves;

this implies that a certain mobility and a certain turnover of executives will be preferred to the stability and slow progress which have so far ever since Fayol been the natural tendency of employers. This tendency moreover corresponded to a certain facility in personnel management.

- These aptitudes will be developed by appropriate training; this necessity has been clearly felt since a substantial proportion of the complementary training of executives is devoted to behaviour training. The implementation of a training policy adapted to each case however requires from employers a fairly complex personnel management; for the time being they generally limit themselves to the presentation and group discussion of working methods corresponding to the specific functions. It therefore seems that measures affecting careers, mobility, the delegation of responsibilities, and general information at present have a greater impact on personal development than complementary training.

It is nevertheless to be hoped that the effectiveness of training actions will increase. For aptitudes are like knowledge; there may be shortage or abundance. National temperament may manifest itself just as well in aptitude for arts as for industrial production. Some countries have substantial reserves of under-employed design engineers while others complain of the lack of creativeness of their executives.

- Aptitudes develop under the influence of the environment. Over-rigid organisation which limits the initiative and responsibilities of the individual is not calculated to develop the faculty of command or to favour the emergence and implementation of new ideas. Organisation could therefore be defined in the light of the activity of the enterprise or service and could be all the more flexible the less the restraint imposed by the nature of material equipment (machines, workshops, services).

It is in these conditions that incentive schemes may reach their full effect. In a rigid and restrictive system the use of aptitudes will be practically nil, and the relations between the enterprise or department

and the individual will be reduced to the exchange of labour for wages in default of personal commitment and an identification of interests between employer and employee.

c) Profitability and efficiency

The criteria for the use of knowledge and aptitudes which have just been considered take no account of the result of vocational activity. From the overall point of view however, this is the principal element of judgement whether one is dealing with an industrial or commercial activity or the functioning of a public service, with productive work or artistic activity. If one refers to the definition adopted above, the result is the touchstone of the qualifications, knowledge and personal attitudes which are merely the means towards that result.

It therefore appears that the principal criteria for utilisation should relate to the efficiency of each individual in his function. Unfortunately, there are a number of objections to this:

- Economic return, that is to say a comparison between salary and monetary evaluation of the results of vocational activity, is scarcely possible in services which have no commercial or operational activity.
- Economic return, like productivity, can hardly be measured except for a group, a department or an enterprise. It is rarely measurable for an individual, particularly at executive and manager level, except for commercial duties.
- Furthermore, salary only rarely represents the real utility of the salary earner. The total salary bill is shared out on the basis of conventions which no doubt have an effect of ironing out differences of personal value at the same level of the hierarchy, and which constitute an expression of social solidarity; these conventions may, on the other hand, give exaggerated preference to certain categories of personnel, such as university graduates over non-graduates.

It therefore seems that the criterion of economic return in the strict sense is unfortunately usually inapplicable; that is the value of management by objectives, which makes it possible to evaluate the results of the activity of each executive in the light of predetermined criteria. Unfortunately, like forecast

personnel management, this type of management is not yet sufficiently widespread.

This rapid search for criteria of utilisation calls for great caution. It has brought out the difficulties of foreseeing the micro-economic consequences of an apparent overall disequilibrium and of an overall interpretation of judgements passed on individuals at enterprise level.

In practice, the use of qualifications is the result of a number of factors of which the environment is no doubt one of the most decisive. It is quite characteristic that in Italy, for example, at the beginning of the 1960s, unsuspected qualifications came to light as soon as economic development and growth demand gave them the occasion of manifesting themselves. In other countries qualifications which have demonstrated their industrial power and which no doubt still exist, no longer have any way of taking effect in the modern industrial structure. This again shows the value of flexible organisation, mobility and open-ended careers in the development of creativeness.

2. The development of qualifications

The foregoing observations show how difficult it is to arrive at an evaluation of the utilisation of all qualified personnel. No doubt the statistics sometimes reveal "anomalies", particularly in the distribution and utilisation of graduates; why for example in Spain less than 10 per cent of qualified agricultural experts are employed in agriculture and why in France only 5 per cent of industrialists and large wholesalers have a post-secondary or higher certificate(1). These "anomalies" sometimes make it possible to draw conclusions as to the functioning of the labour market or the orientation of education, so long as great care is taken to study the social and economic reasons which have contributed to create such situations.

The formulation of a utilisation policy therefore calls for an essentially practical approach, taking account of the wealth and diversity of human personality. It is common to find a man whose qualifications are deemed to have been easily ascertained by reference to his basic training, professional experience and habitual behaviour and who has therefore been assigned to a well

1) Whereas this category amounts to 11 per cent of the work force; Cf. B. Piganiol, The Role of Education in Preparation for Vocational Life, OECD Document.

defined type of activity, succeed brilliantly in a field which seems completely foreign to him. It is also sometimes surprising to see the appointment to executive or managerial duties of men without any scholastic training, who are therefore thought by somewhat hasty inference to have no qualification.

It therefore seems that the promotion of the utilisation of qualified personnel is not mainly a question of remedying identified anomalies but of operating on their causes:

- It therefore means in the first place organising and planning so as to prevent the disequilibria which might result from present employment practices. It means adopting management methods which not only set material objectives but at the same time embody human objectives.
- It then means creating a stimulating environment in which everyone has prospects and the possibility at his own level of taking initiative and putting it into practice. It may be emphasized here that executives and managers are less sensitive to classical incentive schemes than to the possibility of promotion and career development and access to higher posts in another firm or another department.
- It means introducing a complementary training policy which enables everyone to perfect himself, update himself or convert himself.
- It means remedying existing imbalances by specific regrading programmes designed in the light of the personality of those for whom they are intended, such as the Association pour l'Emploi des Cadres.

What means are available to governments and business leaders to encourage a better use of qualified personnel?

a) The existing utilisation of qualifications is conditioned by attitudes and mentalities:

- Within the firm the personnel should find facilities for development and progress and not an organisation designed merely to exploit the aptitudes they showed at the time of recruitment.
- The trade unions do not always recognise the social and economic repercussions of the attitudes they adopt;

the exaggeratedly protectionist measures which they obtain can only harm economic development and very often the interests of their own members. Happily some trade unions have understood the need to participate in this common policy and the benefit they can derive from it for their members; but can the present trade union organisation inherited from the old industrial society really represent qualified personnel, engineers, executives and managers?

- Employers do not always recognise that in modern society the enterprise cannot be looked at purely from the material and accounting point of view as a means of production. In fact the intellectual and creative activity of its executives plays such a large part in the end product that it is conceivable and has often been found that this power of conception and execution is in fact its real strength which can be applied equally well to other productions, other organisations and its initial field of activity. Personnel policy becomes an essential component in the policy of the enterprise as witness today the numerous offers for corresponding jobs.
- This conception should nevertheless not thereby lead to a static and restrictive view; teams, departments and enterprises are constituted in the light of shifting objectives; it is therefore natural for the personnel to remain mobile and adaptable and for the functioning of the labour market to be favourable to that mobility.
- Education and the public services in general should adopt a much more open and positive attitude towards the business world. In these sectors the mode of recruitment, the stability of careers and the absence of direct economic responsibility have developed mentalities fundamentally hostile to change and even for some years past to modern industrial society in general, to which, nevertheless, they owe their existence.

b) The creation of new qualifications, the perfecting and updating of personnel at present available form the second instrument of a utilisation policy. It is in fact the latter which

governments and business leaders consider in the first place, no doubt because it constitutes the prolongation and extension of their traditional policy of "upgrading" and also because it seems more concrete and more suitable for operational action.

In practice this policy is difficult to formulate and it is even more difficult to verify the desirability and performance of the various actions undertaken(1).

These policies have so far been concentrated on the acquisition by operative personnel of a first qualification or promotion to the qualification of technical assistant or supervisor, thus serving both economic and social objectives. In modern industrial society with the extension of education and the growing complexity of tasks this policy should progressively change its aspect while retaining both economic and social objectives, which is an argument for concerted action between management and labour in formulating and implementing it.

This evolution will at the same time be a differentiation; the training of skilled workers and technicians was intended for a population whose ambitions and level of basic education were in the last analysis fairly uniform. In the future, and even already today, a distinction will have to be drawn between needs and actions of a different character according to the objectives and the men affected. If advanced training programmes for specialists can be relatively rigid both in the level of basic knowledge required and in teaching methods, resettlement programmes will affect both self-taught pupils and advanced specialists and commercial executives. Hence the need for great flexibility in training policy which certainly justifies a fairly high degree of decentralisation.

The responsibility of governments in this field is undoubtedly to define this policy in co-operation with management and labour and to try to standardise, co-ordinate and to some extent control, the many initiatives recently taken in this field and at the same time to define the roles of the different ministries and especially ministries of education, in this action.

C. THE ROLE OF THE EDUCATION SYSTEM IN FORMING QUALIFICATIONS

One of the main values of this study of utilisation is no doubt to throw a new light on the question of education, which

1) Cf. Basic Report II.

is the present sector of political concern in most Member countries. No doubt the conclusions which can be drawn from it will be simple and even evident, but rapid economic and social changes and the considerable expansion of education have developed partial and even partisan views among some people.

One tendency which is emerging, which justifies the return to an overall view, is that which assigns education purely social and cultural ends; some people, dazzled by economic progress and the resources which it makes available to the community, believe the time has at last come when everyone can benefit from a culture formerly reserved for the university elite; others, regarding industry a means of oppression, refuse to introduce any vocational purpose whatsoever into education. It becomes necessary to recall that without industrial or commercial activity there are no public resources and therefore no possible education; that without qualification there is no possible employment.

A rapid review, however, shows that the education system has a growing responsibility in the matter of vocational preparation, in proportion as the period of schooling is prolonged; this is only one special point in our comparison between qualifications and functions but one which is of particular economic, social and political importance.

1. Relation between qualification and certificates

The first question which must be asked is on the relation between qualifications and certificates. That is to say the role played in the past by education systems in vocational preparation. Information is available for this purpose derived from population censuses(1), and studies in greater depth conducted by employers, trade associations, universities and sometimes by national statistical institutes on a more restricted sample of the population, often complemented by qualitative appreciations(2).

Consideration of this documentation shows that in fact the contribution of the education system to vocational preparation has been more modest than people like to think and even sometimes

- 1) Cf. Statistics of the Occupational and Educational Structure of the Labour Force in 53 Countries, OECD, 1969.
- 2) Reference may again be made for France to the studies of the Union des industries métallurgiques et minières, the INSEE-OECD survey and the corresponding study by Bernard Piganoil, OECD, 1968 (mimeographed document).

very slender. Reference has already been made to the proportion of engineers and senior executives in French industry with no university or post-secondary diploma, which was 50 per cent and more in the 1960s. In some countries in certain sectors of employment this proportion is probably much higher, but this does not mean that the corresponding vocational training is much better developed and more adapted to the real needs of employment. It means that recruitment conditions are based on the possession of a diploma as the expression of a social hierarchy or simply an administrative rule. Account must in fact be taken of the following:

- All occupations for which an academic or university qualification is mandatory by law such as medicine, the law and the liberal professions as a whole, as well as certain commercial occupations which have in this way obtained a sort of monopoly whose development they control.
- Functions where it has virtually become necessary to be a graduate of a particular school such as the Ecole Polytechnique or the Ecole Nationale d'Administration in France; in this way monopoly situations have been created in which the relation between qualification and diploma is no longer very easily identified.
- Functions which are not clearly designated by the nomenclatures used, thus leading to confusion between function, qualifications, diplomas and even hierarchical level. This fairly often happens with engineers and technicians whose real qualifications are therefore difficult to identify.

The conclusions of this examination are therefore likely to be fairly severe in most countries. Repeating one of the conclusions of B. Piganiol relating to France, it must be taken that "until recently this higher and intermediate technical education did not provide training for the majority of highly qualified personnel, intermediate and senior executives of all types". And yet conditions were perhaps more favourable than they are today for the effective co-ordination of the economic, social, vocational and cultural objectives of education.

One of the essential points of the analysis which should determine the purpose of education and the particular objectives

of its different branches is the comparison between the structure of the education system and the pattern of skills used by the productive mechanism. This comparison suggests two series of comments.

a) A certain correspondence between the structure of the work force and the output of the education system

If one looks back twenty-five years for example, that is to say after the Second World War, it will be seen that the productive mechanism, much less diversified than it is today consisted of large numbers of workers with very little qualification, a relatively small number of technicians and middle executives and a much smaller number of higher executives, liberal professions, etc. To adopt a vogue expression it could be said to have had a "pyramid" structure and it can be taken for the sake of argument that the relative proportions of these three levels were 75 per cent, 20 per cent and 5 per cent(1).

These proportions were almost exactly the same as the annual figures for young people leaving school on the completion of compulsory schooling, secondary education certificate holders and holders of higher or post-secondary education diplomas respectively.

This is, of course, a question of level of education and not level of qualification. The distribution of pupils between general and vocational education will be considered under point (b)7. But at that time the productive mechanism did not call for very complex qualifications:

- Most young people on completing compulsory schooling were destined to become labourers or semi-skilled workers. It was only later in apprenticeship centres, or in-firm training centres or by their personal effort and experience of work that they could acquire real skills (skilled worker or supervisor).
- Secondary school leaving certificate holders, even general, and therefore without any real qualification, nevertheless found a job and managed to make their way in the functions of office worker or middle executive through the enormous superiority of their educational level compared with three-quarters of the population.

1) See for example, Evolutions of the Structure of the Labour Force in Japan, Table III (Background Document N° 5).

- In the same way higher education graduates, by their intellectual superiority or social origin in any event reached the functions of higher executives.

In order to acquire a real qualification and subsequently to meet the growing needs caused by industrialisation, personnel had to count on their own efforts, on employers' personnel policy, on the vocational training and "upgrading" policy of the employment authorities and on the initiative of local authorities. It may be noted:

- That it was in this way that careers could take shape, explaining why around 1960, 50 per cent of executives had no higher or post-secondary certificate(1).
- That the qualifications so acquired - sometimes incomplete and lacking theoretical basis and too specialised - have always been closely adapted to the demand which created them, and that we have had to wait until recent times to see the emergence of problems of adaptability - which are still unknown in Germany, in contrast with most industrial countries.

It may therefore be taken that apart from some specific weaknesses in each country there was a certain correspondence between the pattern of output of the school system in terms of educational level and the needs of the economy; and that while education made little contribution to the vocational training proper, it gave everyone a general training fairly adequate to his needs(2) which it was up to him to complete in his subsequent career.

What is the state of this correspondence today? As a first approximation, the evolution of the economy and of the education system seem to have followed parallel lines and, at the same time that education was developing, technical progress and the complexity of the productive mechanism gave rise to more higher

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- 1) It is obvious that with the prolongation of schooling most workers will have a secondary certificate and nearly all executives will probably have a higher certificate; this will not however prove a closer correspondence between functions and certificates. It was therefore all the more valuable to make use of this example at a moment when it was still possible.
 - 2) From the strict point of view of his rank in the vocational hierarchy and the acquisition of a qualification.

level functions. In practice, if one goes back to the rapid survey by level:

- The level of semi-skilled worker and labourer is no longer supplied by the education system. Although its relative importance has declined, the decline in agriculture is no longer enough to supply it and the refusal of secondary certificate holders to work at this level leads either to the utilisation of foreign labour or to give up certain highly labour-intensive production(1).
- Industry and the economy in fact have a considerable need for middle technicians, but the education systems, except in certain countries - Germany, Italy, etc. - train few technicians at this level, at which general education is in contrast gaining ground.

The problem thus arises, on completion of compulsory schooling or secondary education, of giving the greater part of each generation a genuine qualification. But a technician's qualification is not obtained in the same way as that of a semi-skilled worker; he needs a theoretical basis, a trained judgement and a specialisation; that amounts to a full education which employers cannot provide for everybody.

- At higher level, we have effectively witnessed a multiplication of jobs. But, in the first place, it must be noted that these are jobs which call for a specific qualification, particularly for young people, whereas students today seem rather to turn towards education with no vocational purpose; the multiplication of jobs, moreover, has lagged and will lag behind the expansion of higher education. In consequence, young people who took up studies because they should automatically lead to senior executive jobs are in danger of finding themselves unemployed.

If the change in outlook is added to these causes of disequilibrium, it is easier to understand that the situation today

1) Hence the uncertain future of the building industries, for example. One could also stress the impossibility of present day workers to make a career.

is less favourable than it was, while education systems have a greater responsibility in the creation of qualifications.

b) Vocational education and general education

In most Member countries the education system is traditionally divided into two branches: general education and vocational education.

The comparison above shows that young people with a general education(1) but without qualification find it hard to integrate in the modern productive mechanism and only succeed in finding a job because modern management methods have not yet penetrated all sectors of the economy.

But what can be said about the "products" of vocational education? It is probable that their relative scarcity will ensure them greater security of employment than general education certificate holders. But is vocational education really adapted to the true needs of the economy?

There is general agreement that vocational education - like indeed all education - should prepare for a first job and should provide a training in preparation for a whole career. This leads to certain comments:

- The idea of specialisation has given rise to long discussion(2). It is important to give general technical training which allows the adaptability and possibly the resettlement of qualified personnel(3). Technical and sometimes functional specialisation is however necessary to get a first job and to start on a career. Furthermore, the search for adaptability should not lead to too theoretical or too general education; training in judgement and working methods calls for the support of fairly thorough specialisation selected precisely because of its training value.

1) Secondary or higher.

2) Cf. Design for Engineering Education, Objectives and Conception, OECD, Paris, 1968.

3) The Norgren and Warner report already cited shows how closely specialisation and obsolescence are linked.

- Traditional training attaches great importance to knowledge. In technical functions a high level of knowledge was already actually asked for some decades of years ago; today the functions offered to graduates call for less knowledge but greater ability to apply it and an appropriate mental attitude. According to Professor Livingstone's formulation, the equation:

Knowledge + attitude = qualification

has become:

attitude + basic knowledge = qualification(1)

This shows the uselessness of accumulating knowledge which is still the object of a great deal of education whereas it is rather judgement and the sense of the application of knowledge which is needed.

- Another aspect of this question is whether vocational education is able today to give its pupils appropriate training and attitudes. It is probable, especially at higher level, that studies are conceived in too abstract and academic a fashion and that they incline people to research and teaching rather than to active functions in the rest of the economy; it may therefore be asked, as some governments have already done, whether these studies do not to some extent constitute a sterilisation of talent when they are carried too far and whether they do not alienate the students from active life rather than preparing them for it.

These remarks apply with even greater force to general education and to the complementary education which will be given to young graduates to enable them to find a job. With the prolongation of schooling, secondary education becomes in fact terminal education for most pupils; it should therefore give them all a minimum of vocational preparation. It is an illusion (in Europe) to propose a solution by creating post-secondary education establishments which would require pupils to prolong their schooling at least two years, a step which is still premature. The only solution lies in the renovation of technical education.

1) Harvard Business School. This formula applies to industrial organisation but not necessarily to all professions such as medicine and law.

2. Educational objectives and planning

Immediately after the Second World War the simultaneous development of the economy and of education created, as already indicated, a certain correspondence between functions and educational level. This correspondence quite naturally led education specialists:

- to develop a conception, and moreover a most attractive one, of the twofold cultural and vocational purpose of each level of education in preparation for the various levels of functions offered by the economy(1); and to emphasize the political and social need to provide bridges from one channel to another and to enable certificate holders to undertake further studies with a view to higher qualifications;
- to construct educational planning methods on the needs of the economy or more exactly on this correspondence between level of education and level of functions and to stress the idea of investment in education.

Do these conceptions and methods still retain, and will they continue to retain, their full value in the new industrial society? The answer to such a question obviously depends on the criteria adopted to define this "new society", that is to say the level of economic development, and particularly of industrial development, of each country and also the level of education development(2). This question calls for the following comments:

- a) The average educational level of the workers is still not very high in most Member countries. Even in the United States for example, where average schooling lasts for more than 12 years, some sections of the population have been untouched by the expansion of education, so that it will still be possible to find in the next ten years and even longer a certain correspondence between the level of education and the level of function. Those who have not benefited from education for any reason whatsoever will

1) Cf. In particular that developed by the Italian Parliamentary Commission on educational development.

2) It is perhaps not so much a question of the level achieved as of the history of that development. We should rather speak of the "integral" of the education function.

always have an inferior situation on average to the rest of the population and this discrimination is likely to be accentuated as the average level of education rises.

Similarly, the particularly gifted children will probably always have better school results than the others and better vocational success.

This correspondence, however, will only be really characteristic in marginal groups, the least favoured or the most favoured. But employment in the next ten years will be characterised by the numerical and economic predominance of the middle classes.

b) Educational planning, in basing itself on this idea of correspondence between function and level of education, took little account of the possibility of advancement, that is to say of a career, or of the relativity in the present state of knowledge of the idea of qualification. To correct this approximate character of theory, it was necessary to introduce a concept of "substitution" which is supposed to explain;

- the fact that men with modest training occupy with some success functions which do not normally correspond to their standard of training (50 per cent in the French example);
- the fact that similar industries employ, according to the resources of the local market, quite dissimilar sets of qualifications(1).

It is certain that, in spite of the rising level of education, these two fundamental phenomena will always exist, but that in future they will be statistically less evident. It may then be feared that the calculations of correlation, elasticity, marginal performance etc., to which this concept of correspondence has given rise will no longer be anything more than academic exercises.

A fairly simple conclusion from the foregoing analysis is that over the last twenty years educational levels corresponded statistically to an average capacity to acquire a certain level of qualification. It has been shown that the growing complexity

1) Cf. Background Document N° 2.

of functions today requires at all levels a minimum starting qualification and no longer merely a certain level of education.

It therefore seems that educational planning can be brought down to a small number of propositions:

- To give the greatest number, that is to say, secondary, intermediate and higher certificate holders, a genuine vocational preparation and the beginnings of a qualification.
 - . By reforming general education curricula.
 - . By renovating and developing technical education.
- In countries where the ministries of Education do not assume this task, the ministries of Labour and Social Affairs should in practice take charge of the adaptation and qualification of young workers(1).
- To develop as far as possible post-secondary education which is not only a way of making up for the faulty orientation of secondary education or of looking after the rejects from higher education, but which in fact confers a qualification and meets a demand on the labour market.
- To adapt, in accordance with these same criteria, the objectives and functioning of the university to its social and economic role and responsibility.

The study of employment hardly makes it possible to go any further with educational planning. It can only be completed by the discussion of specific cases(2) such as those of doctors and teachers, whose employment depends fairly directly on national policy, in the hope that students and teachers will accept the selections which will very certainly result from such forecasts.

3. Complementary vocational training

The rapid evolution of the economy and the political need to allow the evolution of society and the development of man-made continuing education a "national obligation"(3).

- 1) Cf. the respective roles of these two ministries in Italy in vocational training: Reviews of National Policies for Education - Italy, OECD, 1969.
- 2) Of the type of the occupational outlook in the United States.
- 3) Act on continuing vocational education and training, France 1971.

From the point of view of the economy and employment, which, moreover, very largely coincides with individual interests, the object of complementary training is:

- To make up for the insufficiency or lack of adaptation of qualifications and to obviate unemployment (full employment).
- To enable everyone to acquire a higher qualification or to resume interrupted studies (up-grading, recurrent education).
- To adapt himself to technical evolution and to prepare himself and perfect himself with a view to new functions (continuing education and career development).

The evaluation of the needs corresponding to each of these functions, or more exactly the orientation of government efforts, depends on a quantitative and qualitative study of employment and a comparison between functions and qualifications.

CHAPTER III

CAREER PATTERNS

The whole of the foregoing analysis has been made from an instantaneous and overall point of view; this confrontation has brought out a certain number of quantitative and qualitative disequilibria. It would certainly be incomplete without a consideration of what these disequilibria mean to the individual and how they react on the development of his professional career.

In practice, the comparison between functions and qualifications has already indicated the possibility of conflicts arising out of the accepted idea of careers. If this idea is to be challenged, it is not without value to recall the factors which have contributed to create it:

- The need to fill management posts by internal recruitment from among people with the necessary qualifications and experience; this need was no doubt felt in the public service and then in big business which is hierarchically organised on much the same lines.
- The idea of a career was reinforced by industrial development and the growing need for qualified personnel, leading to the creation within the firm of qualifications not to be found on the labour market or insufficiently provided by the education system; this complementary training, in which vocational experience plays a major part, enables personnel to move up to more responsible posts and consequently to higher levels in the hierarchy; it may be noted that in this way the benefit of a career has been extended to other categories of personnel of a more modest social or school origin.
- The desire of workers, particularly the less well paid workers, for a better paid job and their ambition

to acquire higher social status by taking advantage of greater experience or higher qualifications.

- A generally accepted principle which can be likened to the principle of preserving vested rights, namely higher pay even for equal work, depending on age and length of service.

The combination of these factors has so far allowed a certain adjustment to the requirements of economic progress, an adjustment which in practice has meant a general rise in the level of qualifications, though we may perhaps be forced to recognise that this rise has not affected the different social strata equally. No doubt workers at all levels have been able progressively to climb the ladder of the hierarchy by internal promotion, by changing employers or by changing the status of employee for that of craftsman or entrepreneur; it can nevertheless be said that in general, workpeople have had little chance of a career and that this concept mainly applies to executives and managers. From a strictly economic point of view, it can, however, be estimated that this distribution of opportunity effectively matched the needs, and that these forces have so far worked together in favour of economic and social progress. The question is whether they are not now in danger of clashing.

a) The transformation of the economy

The transformation of the economy considered above leads to the decline or disappearance of certain activities and the concentration of enterprises; this evolution normally involves in the sector concerned a contraction in the number of management posts and a reinforcement and specialisation of the technical and administrative services. Economic evolution within a sector therefore leads more to adjustment, specialisation and even to conversion than to promotion and ascent in the hierarchical organisation.

It will be noted that if the expansion of a sector remains below a certain threshold, the possibility of a progressive career will depend on escape towards more rapidly developing sectors. Promotion possibilities will nevertheless remain limited by the hierarchical structure of the new industrial society; the number of responsible posts has no doubt greatly increased, but does not allow graduates to reach top management posts which formerly came to them almost automatically.

The case of small and medium firms is worth special examination; it has been noted that this sector employs personnel somewhat different from those of the large firms although certainly equally well qualified. But it is found that the personnel thrown on to the labour market by the disappearance of small firms are difficult to assimilate in the big firms, although this is practically their only hope of resettlement.

b) The inflow of graduates

The inflow of young graduates, usually recruited at a certain level in the hierarchy, will soon be a source of conflict with existing personnel for access to responsible posts. At present this competition scarcely manifests itself except at the time of recruitment and it is usually the young graduates who are the losers; it may be noted that a mere slowing down in expansion might reduce the annual recruitment of graduates by 20 to 30 per cent and that in most countries this fall equally affects vocational education graduates.

At a later stage it may be expected that the great expansion of education and particularly of higher education will lead to a bitter struggle between graduates for management jobs and the consequence will be a block in internal promotion and increased discrimination between graduates and non-graduates. This situation will, however, perhaps be more marked in the public service and the services sector than in industrial and commercial activities:

- Qualification acquired in the firm will often remain much sounder and safer than that of graduates who lack practical experience. This comment is perhaps less valid in the technologically advanced sectors, but judging from the American situation it is by no means certain that these sectors will experience very fast expansion in the next ten years.
- Young graduates will generally have had a training which does not prepare them for integration in the productive mechanism. We have seen that the proportion of technicians and scientists is falling in most countries and that in addition higher education is at present inappropriate for training the mind for business management.
- Industrial employers, or at any rate the big firms, often merely treat a degree as an indication. For

some of them in practice a degree indicates sufficient aptitude to justify further investment and evidences a certain perseverance and will to work.

- The somewhat abstract tendency of technical and scientific studies which has been mentioned is a fairly good preparation for functions of research or design but not at all for functions without management responsibilities.

It may therefore be thought that in business firms competition will remain relatively open in so far as qualifications will be demonstrated by immediate material results. It is to be feared that in other cases the absence of unchallengeable criteria will lead to a certain incoherence in career patterns.

c) The evolution in the respective roles of capital and labour

The effects of this evolution are somewhat complex and indirect and even their direction does not yet seem to be clearly determined. This should not lead to their being disregarded; it is clear that proprietorship is losing part of its social and economic influence and that executives and managers by their numbers and functions hold growing power in society and business.

In traditional capitalist societies the interests - at any rate in the short-term - of employers and employed were fairly clear; this is no longer true in the new industrial society where capital is depersonalised and management is in the hands of paid executives(1). This evolution may have two consequences:

- Decisions affecting the running and even the existence of the business can be taken only in the light of financial criteria regardless of their social consequences, and they could be more rigorous than those which would be taken by a chairman more or less bound to his firm and feeling a social responsibility to his personnel.
- It may also be thought that the personnel, not accepting this dependency, might take the place of capital and in fact take over the management; this leads to the conception of an enterprise not solely concerned with profit and might even lead to the desire to continue at a loss activities which no longer met demand subject to asking for government assistance.

1) Once again small firms must be considered separately.

These two conflicting trends may counterbalance each other or one of them may prevail according to the size and activity of the business. It is not illogical to think that a firm employing a great deal of unskilled labour, in the textile industry, for example, will have no chance of survival except in so far as measures of protection may canalise internal demand. On the other hand it is probable that a firm employing highly skilled personnel (research institutes, aeronautical industries, etc.) may have sufficient weight with public opinion to make governments decide to continue its activity.

It should be noted in this connection that a growing proportion of personnel is employed by non-profit making organisations (in the United States one half) where the demand for participation and the possibilities of self-management are greater. This circumstance may influence attitudes and claims and give greater weight to the second trend.

d) Trade Union claims

The foregoing remarks indicate the change in the setting of trade union negotiations, which are increasingly spreading beyond the limits of the firm, and in the nature of claims. In the first place the personnel of the firm no longer find themselves faced with a directly responsible counterpart, as still happens in small firms, and secondly the claims are no longer those of the work-people only, but also increasingly of the executives.

Executives and managers are not represented in all countries by a trade union such as the *Confédération générale des cadres* in France. Their responsibilities of management and command have given them an intermediate role in industrial organisation, but also a fairly privileged position which often made them feel closer to the owners than to the rest of the paid staff.

Today the increasing complexity of the productive mechanism has increased the number of executives, at the same time that social progress has made it possible to extend their privileges to other categories of workers⁽¹⁾. Hence a certain shift and evolution in the nature of trade union claims.

These claims no longer relate solely to increased income but also more and more to social advantages. We have had occasion to show that social measures, particularly when taken in response to

¹⁾ The progressive changeover to the monthly payments of French wage earners for example.

trade union claims, are not always favourable to economic development. The growing influence and weight of qualified personnel may arouse the fear of formulation of excessive demands for social progress; the resulting agreements might fail to take account of the specific problems of the firm or the sector or of personnel skills and thus result in artificial equilibrium.

These social claims may relate to the right to education and complementary training (French Convention of 9th July, 1970); the corresponding measures can scarcely fail to be favourable to economic development, by the spirit of emulation and drive which they may contribute if they do not unduly increase the cost to the firm. The only fear is misuse and faulty distribution of the corresponding funds and resources.

But claims may also relate to security of employment or the guarantee of a progressive career⁽¹⁾; such measures would certainly introduce inflexibilities which would be inclined to have a converse effect. It is therefore to be hoped that trade unions will in future recognise their responsibilities in economic development.

In fact, progressive careers which were a necessity have become a social habit whose spread is connected with that of big firms and public authorities, and it can already be seen that the mechanism created goes beyond what is necessary and constitutes a source of tension.

In the professions and in the small firms there are no careers, there is merely a succession of events, of more or less fruitful years, in some cases a success which can be assimilated to a social ascent; they nevertheless give qualified personnel the opportunity of personal development.

If modern industrial society is no longer purely that of economic expansion but also - particularly in medium-power countries - of re-distribution of activities can this social habit be perpetuated? Will not highly qualified personnel, managers, engineers, technicians, be obliged to keep a certain distance from the organisation which employs them and to regard their work as would be done in the liberal professions, that is to say to look for the best commercial use of their professional skill?

A utilisation policy should be designed to make the best of skills and qualifications; it should therefore encourage professional

¹⁾ One can already cite cases where personnel who have had the complementary training demand advancement; this advancement however is unjustified in the case of adaptation to duties already exercised or of reconversion.

development as much as possible by combating checks and inflexibilities of all kinds but basing itself on real needs resulting from end demand and not only on professional ambitions which would be impossible to satisfy.

A. RECRUITMENT AND THE ORGANISATION OF THE LABOUR MARKET

The distribution of qualified personnel in the economy, its mobility from one sector or firm to another, depend upon the information available to it about the labour market and about recruitment mechanisms. These questions have been studied with great care in the case of workpeople, and the employment authorities have set up fairly effective mechanisms. For various reasons, however, these mechanisms are by no means suitable for highly qualified personnel for whom specific measures must be taken.

The first question is whether the whole of the labour market for qualified personnel is covered by present systems of information, selection and recruitment i.e. advertisements, specialised agencies, professional associations and public employment services. Without going into a detailed study here it may be noted:

- That advertisements generally relate to young graduates, young executives who have already acquired a first technical specialisation in a firm and specialists in a given branch. These are the people whose functions are easiest to describe and who are more or less interchangeable executives with defined and specific functions(1).
- That the public employment services, when they interest themselves in personnel of this level, concentrate their efforts on marginal cases, unemployed executives and unemployed young graduates and social cases, etc., and equally therefore merely cover the fringe of the population.

There is therefore every reason to think that the bulk of recruitment or employment possibilities still escapes information,

1) This idea of "elementary" functions has been noted above; it should be remembered that it is to this type of function that mobility is linked, from the semi-skilled worker on the local market up to the researcher on the international market. This may be connected with the mechanism indicated, as well as with the capacity to do the job which is more easily checked.

and that employers prefer to resort to personal contacts, to in-firm promotion or to an association which will supply them with personnel who do not always have specific preparation for the proposed functions.

It is clear that the improvement of the present situation depends on the development of the role of public or private agencies, a more specific character of functions, that is to say a better business organisation. To this can be added the following complementary remarks:

- The enterprise and the "trade" (that is to say in economists' language, the sector) constitute a first limitation on the circulation of information and on the recruitment zone and in practice on mobility, which is not always technically justified; the relative easiness of ascertaining the employment situation in one's own firm or trade leads to not looking elsewhere.
- Consideration of advertisements by firms or agencies shows the existence of certain sequences of functions from which it is as difficult to escape as it is to penetrate them. It would be valuable to take account of them in the conception of job turnover so as to make the personnel specialised and versatile; it is certain that at present the first job almost automatically determines the subsequent career.

Under present conditions the labour market is far from having the desirable fluidity, and in order to allow a better distribution of qualifications and to facilitate progressive careers and to forestall unemployment it is essential to limit as far as possible the inflexibilities in the functioning of the labour market and to assign objectives and allocate resources to the public employment services which will make up for these deficiencies.

B. MOBILITY AND CAREERS

Should occupational mobility i.e. the sequence of changes of jobs, employers and status in professional life be regarded as one of the essential characteristics of the new industrial society? How far is it necessary? How far should it be encouraged?

Many employers still think that the personnel whom they have recruited and whom they have helped to train should normally pursue their career in the enterprise. It is quite certain that this policy has had many advantages so long as international competition or technical progress did not slow down activity or lead to recessions. In the modern world these changes are becoming the rule, with the result that employers have to dismiss staff and workers find themselves forced into mobility and resettlement(1) and the slightest slowing down in expansion, it has been noted, limits the progression of careers.

It may therefore be concluded that greater mobility than at present is essential; employment for life of the Japanese type, even in industrial groups with diversified activities, will soon be no longer possible and present employment practices will not only be a source of tension and unemployment but a misuse of skills.

It is certain that employers still have sound reasons to oppose the mobility of their personnel. In the first place an executive becomes really effective in a job only when he has mastered its various aspects, that is to say after a period of adaptation; secondly, the enterprise makes investments in the training of its executives and it is quite natural that it should be reluctant to see them go over to other firms, sometimes competitive(2). But within certain limits which separate mobility from instability, is not excessive importance attached to these reasons and would the firm itself not benefit from greater mobility?

- Mobility is a permanent way of adaptation to the changing needs.
- It is a means of transmitting information and methods and therefore a stimulus for qualifications.
- It is a tested method of maintaining the drive of groups which as a result of too much stability may fall into routine.

Several American companies have even said that they think it natural and acceptable that some of the executives they have trained (some of whom follow up to six months' full-time courses) should sell

1) "Passive" mobility in contrast with "active" or deliberate mobility.

2) In many countries employers are afraid that personnel who leave them will pass on their trade secrets to other firms (clauses in restraint of competition); it may be asked how far these fears are justified and whether these clauses are in fact observed.

their qualifications to other employers; by raising the prestige of the firm this policy makes it possible to attract and retain the best brains. We have seen how greatly the modern small firm depends on this contribution of specialised qualification and the complementary role it plays in relation to the big firms.

At the present time, the questions of mobility are far from being satisfied, especially in Europe and Japan, and one of the aims of a utilisation policy will be to identify and as far as possible to eliminate the obstacles to it:

- Material and institutional obstacles

These obstacles are very varied; they are connected with housing, pension schemes and complementary social benefits enjoyed by the personnel of certain firms or certain sectors.

The special advantages accorded by employers to retain their executives, or obtained by trade union negotiation, become in fact today restrictive practices in the matter of employment. In many countries, for example, it has become practically impossible to transfer from the private sector to the public sector where retirement, career patterns and modes of recruitment differ.

These material or institutional obstacles are all the more serious since it has become hard to remedy them and they are reinforced by psychological obstacles of which they are sometimes the material expression.

- Psychological obstacles

The psychological obstacles arise from the employer as well as from the employee, but it can be said that in practice it is the employers who are responsible for them, by creating an environment shut off from the outside world, where contacts and decisions are reserved for the top level leaving the rest of the personnel in isolation. This often happens in the army, in research, in the public services and in big private companies with their own rules and values.

These obstacles may also be linked with discriminations against non-graduates, women or coloured people or of the preferential employment of graduates of certain universities; people who have succeeded in building up a situation are afraid of not being able to find it elsewhere.

The present concept of careers is hardly favourable to

mobility(1); employers decline to recruit above a certain age limit (which may even be 30) progressive salaries make the employment of older executives problematical and executives who have already had experience with a number of employers are suspected of instability. Only specialists profit from exception; is this not the confession that many jobs in the firm cannot be expressed in terms of specialised qualification?

C. WHAT IS TO BE EXPECTED FROM COMPLEMENTARY EDUCATION AND TRAINING

In the course of this analysis of employment prospects the role and objectives of complementary in-career training have taken shape. It has been noted that the complementary training which has so far been essentially aimed at creating qualifications and therefore at upgrading will have to concentrate on objectives of adaptation and adjustment.

The policy of creating qualification was fairly simple in conception; it was merely an extension and diversification of education policy. Programmes were fairly similar and students of a fairly uniform level.

The policy of adapting qualifications must take account of very diverse needs and objectives and the level and skills of its beneficiaries will be far from uniform. It is therefore much harder to conceive and manage.

Complementary training therefore seems, on the same grounds as mobility, an instrument of national adaptation policy; in addition, like mobility, it may be a stimulus and may develop drive and creativeness.

Several questions arise for policy makers:

- What can be expected from complementary training?
- Can training needs be assessed?
- What resources is it logical to allocate to it?
- Is it possible to assess the effectiveness of programmes undertaken?
- What are the role and responsibility of governments?

1) On this point the State is undoubtedly one of the most exacting employers and the most remote from the desirable attitude.

There is no absolute answer to any of these questions⁽¹⁾ in the case of complementary training as in the case of mobility and the distribution of qualified personnel it would be very hard to define an ideal situation. It is only possible to define the direction of efforts and to some extent to set priorities.

When policy was essentially designed to create qualifications, priorities were mainly determined in the light of the sector and level; vocational training for the worker, training of technicians, etc. Nowadays when adaptation is proposed, the establishment of priorities depends on a more thorough analysis of needs, on empirical judgements and on social or political priorities. At the present moment, the following order may be most appropriate:

- absorption of unemployed
- firms' special needs for personnel
- overall adaptation of qualifications.

It is by no means certain that this order cannot be reversed in the next few years.

The diversity and very nature of needs make it essential for national policy to leave wide room for local initiative and private enterprise. The role of Government is therefore primarily to allow the development of these initiatives by according its aid in the light of priorities and of the insufficiency of private enterprise, but it is above all in this changing society to co-ordinate and harmonize these efforts at present too dispersed, in order that everyone concerned with training can define the field in which his action is most effective.

¹⁾ Some economists have tried to answer the question on the basis of the marginal benefit of complementary training efforts. This assessment is open to serious criticism in the case of a policy of creating qualifications; it is even more so in the case of a policy of adaptation and adjustment.

II

FURTHER EDUCATION AND TRAINING OF HIGHLY QUALIFIED PERSONNEL

by

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Preliminary Note

Together with mobility, further in-career education and training is a way of ensuring a more effective utilisation of highly qualified personnel in order to meet the increasingly rapid economic changes in modern communities.

Specific schemes of education and training have still to be devised. Except as an illustration, no detailed description or index of schemes already undertaken in the various countries will be found in this report.

The report is the result of a study of the situation prevailing in most Member countries. It endeavours to prepare the ground for an analysis of the influences exercised by the various socio-economic forces on further education and training. It therefore attempts at the onset to clarify existing concepts in order to identify the nature of existing needs and assess their scale more effectively. These needs are first considered as a factor in the operation and expansion of the individual enterprise and are then studied from the national standpoint i.e. the vital need to adapt to economic trends and continue to improve social standards.

This analysis is followed by an attempt to sum up the objectives and forms of the further education and training policy and introduces the problem of its repercussions on the educational system. It concludes with a survey of the practical problems which might be discussed by the Conference.

These practical problems are dealt with in detail in Discussion Paper C.

TABLE OF CONTENTS

Introduction	216
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Chapter I

CONCEPTION AND OBJECTIVES OF FURTHER EDUCATION AND TRAINING	221
A. Further education and training of highly qualified personnel	221
B. Objectives of further education and training	227
1. Scope of present efforts	227
2. Classification of objectives	228
3. Shortcomings of occupational education and training	233
4. Socio-political and economic constraints	234
C. Further education and training in a policy of utilisation	235
1. Link between the two concepts	235
2. Analysis plan	236

Chapter II

FURTHER EDUCATION AND TRAINING OF PERSONNEL IN THE ENTERPRISE	237
A. Introductory remarks	237
B. Analysis of requirements: nature and estimate	238
1. Further education and training of specialists ...	240
2. Education and training for management functions .	247
3. Adaptation of young graduates to their initial employment	249

Chapter III

FURTHER EDUCATION AND TRAINING AS AN INSTRUMENT IN THE NATIONAL POLICY FOR ADAPTATION AND PROGRESS	257
A. Introductory remarks	257
B. Analysis of requirements: nature and estimate	259
1. Raising of the average level of qualifications ..	261
2. Conversion of under-utilised or unemployed personnel	263

Chapter IV

FINANCIAL PROBLEMS	268
A. Introductory remarks	269
B. Cost evaluation	269
1. By firms	270
2. By public authorities	271
C. Evaluation of efficiency	272
1. At firm level	272
2. At national level	273
D. Allocation of costs	273
1. Levels of motivation	274
2. Analysis by objectives	275
E. Joint action	276
CONCLUSIONS	277
A. Responsibilities for policy direction	277
B. Repercussions on the educational system	278
C. Political role of the public authorities	279
1. Definition of objectives	279
2. Action required	279
3. Harmonization of policies	280

LIST OF TABLES

1. Levels of training among scientists and engineers in the United States in 1960	222
2. Educational breakdown of certain socio-professional groups in France in 1964	223
3. Breakdown of French highly qualified personnel showing function and university degree (1968)	224
4. Scientists and engineers whose diploma did not tally with their professional functions in the United States in 1960-1962	224
5. Individual view of the need for further education and training in Japan	243
6. Attitude of enterprises to further education and training in the opinion of their personnel	245
7. Training schemes in Italian firms with over 500 employees	245
8. Demand for retraining in the French electronics industry estimated by occupational categories over five years ...	246
9. Demand for retraining in the French electronics industry estimated over five years according to the level of basic education	246
10. Management training as a proportion of the further education and training given to the active working population in Japan	250
11. Situation of persons graduating from United Kingdom universities between 1st October, 1968 and 30th September, 1969, at 1st December after graduation .	255
12. Social upgrading courses in France in 1967-1968 with a breakdown by levels of skill	264
13. Breakdown of expenditure on further education and training schemes in Italian enterprises	271
14. Breakdown of the appropriations of the "Fonds de la formation professionnelle et de la promotion sociale" in France	272

INTRODUCTION

In-career education and training is considered here in connection with the utilisation of highly qualified personnel which is a short or medium-term objective only. The schemes suggested are not linked, in the first instance, to any general system of permanent education and training for none has been put into effect as yet or even satisfactorily formulated(1). Consideration will be limited to economic and social factors likely to influence effective planning by the responsible authorities in Member countries. These factors will necessarily be related to the educational system. Indeed, a survey of the distribution of responsibilities and the allocation of costs for these schemes will call for a study of the organisation of in-career education and training in the light of the opportunities offered by existing educational structures and will make it necessary to consider the adaptation of these structures to meet the requirements of this type of education and training(2).

Within these limits, in-career education and training may be defined as a post-educational training system designed to provide any individuals who so wish with the means to correct a mistaken vocation, make good the gaps in their education and training and meet their need for further training or a change in occupation.

- 1) A number of bodies are engaged on the long-term task of working out a system of permanent education and training beginning with a definition of the term itself. Until this essential point is clarified the issue will continue to be confused and many of its implications evaded. Behind the current phraseology with its many ambivalent meanings it is perhaps possible to identify permanent education and training as a generalised compulsory educational system designed to phase the acquisition of new knowledge over the whole of a working life. No surveys of the economic, social, psychological and pedagogical requirements and consequences of the system have been carried out nor have such surveys always been envisaged.
- 2) This process of adaptation may well lead to a system of permanent education and training.

As defined, in-career education and training is one of the principal ways of ensuring the optimum utilisation of the work force. It may operate directly by providing specific knowledge. It may also promote other measures, e.g. make a career more attractive or to foster greater mobility. It is not only a means of individual upgrading but also of economic growth and social progress. Its effects are particularly widespread when they involve highly qualified personnel whose planning abilities and practical judgement are essential factors in the development of societies and civilisations.

Chapter I

CONCEPTION AND OBJECTIVES OF FURTHER EDUCATION AND TRAINING

A. FURTHER EDUCATION AND TRAINING OF HIGHLY QUALIFIED PERSONNEL

Further education and training may be envisaged for a variety of situations and apply to diverse categories of highly qualified personnel:

- a) those who have received a formal education designed or considered to fit them for the functions they exercise;
- b) those who have received a formal education considered to fit them for certain functions which they do not yet exercise, e.g. young graduates seeking employment;
- c) those who have received a formal education considered to fit them for functions other than those they exercise;
- d) those who have received no formal education leading to a degree but exercise functions at the level concerned;
- e) those who have received no formal education but are capable of exercising highly qualified functions provided they receive the appropriate education and training.

It will therefore be seen from this first glance that further education and training is intended either to compensate for the absence of a basic training by providing specific knowledge or to make good the absence of experience among junior personnel who have just completed their formal education by adapting them to the tasks they will be called upon to exercise(1). But in actual fact further

1) When it is concerned with adapting young graduates to their first job this training might logically be considered as a practical finishing touch to their formal education or as an apprenticeship to the duties they will be required to perform. And yet it is more often classified as a type of in-career training, no doubt because it has always been provided outside the established educational system. At the present time there is a tendency towards more effective co-operation between education and industry and mention may be made in this connection of the interesting British experiment with "matching sessions". See The Bosworth Report, Background Document No. 13 for the present Conference.

education and training schemes are often organised indiscriminately for these various categories of personnel and the differences to which we have just drawn attention become significant only when an attempt is made to evaluate requirements.

A person's educational background is doubtless not the best criterion for assessing the type of further training he may require. In most cases this system of reference does not tally with the observable facts and except in certain special situations the possession or absence of a diploma is no accurate guide to an individual's abilities and talents. In the first place it is often observed that education alone does not guarantee efficiency and that practical experience is a necessary requirement. And whatever the future level of studies may be it must be realised that a person's qualification should not be confused with the level of the diploma he has obtained. Tables 1 and 2 provide a few details in this connection relating to the United States and France.

In Tables 1 and 2 the employment variables are the profession or the socio-professional category. Table 3 provides a further clarification by showing the educational level of managerial staff in enterprises with over 200 employees in south and south-west France in 1968.

Table 1

LEVELS OF TRAINING AMONG SCIENTISTS AND
ENGINEERS IN THE UNITED STATES IN 1960(1)

Level Profession	Percentages						Total
	No college	Some college	Bach- elor's Degree	Bach- elor's plus	Mas- ter's Degree	Doct- orate	
Engineers	13	34	29	17	6	1	100
Physicists, chemists	7	18	23	21	16	6	100
Biologists, agriculturalists	6	12	16	16	23	28	100
Mathematicians, statisticians	13	22	17	18	21	10	100
Sociologists, psychologists	4	11	9	13	33	31	100

1) Cf. S. Warkov and J. Marsch, The Education and Training of America's Scientists and Engineers, 1962, Report No. 104 of the National Opinion Research Center, University of Chicago, October, 1965, p. 17.

Table 2
EDUCATIONAL BREAKDOWN OF CERTAIN SOCIO-PROFESSIONAL
GROUPS IN FRANCE IN 1964(1)

Level of diploma	No diploma		Primary school		Secondary school		Technical school		Higher education		Total %	by age groups
	under 46	46 and over	under 46	46 and over	under 46	46 and over	under 46	46 and over	under 46	46 and over		
ACTIVE MALE POPULATION												
Socio-professional group	Heads of industrial and commercial enterprises(2)	21.4	36.2	42.5	45.0	5.8	5.5	28.6	10.3	1.7	2.5	100.0
	Self-employed professional workers, teachers, engineers	0.5	2.3	5.1	4.8	9.2	13.6	17.3	15.7	67.9	53.6	100.0
	Administrative, commercial and technical executives	7.7	14.3	18.2	33.2	20.1	22.6	40.4	20.0	13.6	9.9	100.0
ACTIVE FEMALE POPULATION												
Socio-professional group	Heads of industrial and commercial enterprises(2)	23.3	35.6	52.2	49.2	6.8	7.4	16.9	7.6	0.8	0.2	100.0
	Self-employed professional workers, teachers, engineers	0.6	1.1	1.6	11.1	7.1	22.3	11.2	5.5	79.5	50.0	100.0
	Administrative, commercial and technical executives	4.2	8.9	9.3	11.7	47.3	45.1	27.8	27.9	11.4	6.4	100.0

1) See B. Salais, "Les niveaux de diplôme de chaque catégorie socio-professionnelle" (The diploma levels of each socio-professional category) in *Recherches Économiques*, Institut national de la Statistique et des études économiques (France), February, 1970, p. 31.

2) The group "Heads of industrial and commercial enterprises" was included although it contains a considerable proportion of persons who cannot be considered as highly qualified personnel. For example, in 1966, craftsmen, trawler skippers and small tradesmen accounted for almost 50% of the heads of the industrial and commercial population group. The breakdown of the sub-group "Industrialists and large-scale traders" was as follows (men and women):

- no diploma: 6.7%
- primary school: 40.6%
- secondary school: 16.8%
- technical school: 32%
- higher education: 3.9%

Table 3

BREAKDOWN OF FRENCH HIGHLY QUALIFIED PERSONNEL
IN 1968(1) SHOWING FUNCTION AND UNIVERSITY DEGREE

Function	Percentages		
	Degree	No degree	Total
Manufacturing	39.3	60.7	100.0
Research	62.9	37.1	100.0
Marketing	18.7	81.3	100.0
Administration	25.0	75.0	100.0
Management	55.4	44.6	100.0
Total	39.1	60.9	100.0

1) See "Les besoins de formation en cours de carrière des ingénieurs et des cadres", (in-career training requirements of engineers and managerial staff) in Hexagone Initiatives No. 58, June, 1969, p. 14.

Table 4

SCIENTISTS AND ENGINEERS WHOSE DIPLOMA DID NOT TALLY
WITH THEIR PROFESSIONAL FUNCTIONS IN THE UNITED STATES
IN 1960-1962(1)

Diploma level Profession	Percentages							
	Bachelor		Bachelor plus		Master		Doctor	
	25 to 34	from 45 to 54	25 to 34	from 45 to 54	25 to 34	from 45 to 54	25 to 34	from 45 to 54
Engineers	13	18	19	26	24	39	23	59
Physicists, chemists	31	24	39	42	29	46	35	24
Biologists, agriculturalists	21	20	29	33	14	20	14	11
Mathematicians, statisticians	40	74	39	59	37	47	19	28
Sociologists, psychologists	65	71	50	56	43	64	11	24

1) See S. Warkov and J. Marsch, "The Education and Training of America's Scientists and Engineers, 1962", Report No. 104 of the National Opinion Research Center, University of Chicago, October, 1965, p. 177.

When an attempt is made to specify not only the educational level but also the nature of the formal training of personnel exercising highly qualified functions, it is frequently found that these two variables, i.e. training and function, do not tally. Table 4 gives an idea of this discrepancy in the case of scientists and graduate engineers in the United States in 1960-1962(1).

The frequent discrepancy between levels of study and qualification and between the specific nature of the training received and the functions exercised may be due to a longstanding shortage of educated people(2), (a trend which, generally speaking, is now disappearing and has even been reversed) or the inability of the educational system to meet the demand for qualifications(3) or its incapacity to prepare personnel for specific functions(4), or may arise from a failure to make economic forecasts or provide vocational guidance, or defects in the operation of the labour market, or may merely be attributable to personal circumstances(5). But

- 1) The reader is also referred to S.L. Wolfbein, "National Policies and Institutional Arrangements (United States)", Paper No. 1 of the present Conference.
- 2) For example in his article "Enseignement de l'administration des entreprises" (The teaching of business management), Revue mensuelle de l'organisation, France, March, 1968, P. Bize points out that the 300,000 managers and senior executives performing management functions in French industrial and commercial enterprises of any importance had terminated their formal education by the age of 18 or 20.
- 3) The French Survey on Employment and Occupational Mobility of Highly Qualified Personnel in France (OECD document DAS/EID/68.36) shows that 53.8 per cent of senior executive jobs for men were held in 1964 by persons who had no university degree or technological diploma. If all executive jobs (top and middle management) are considered, 76.2 per cent were held by men without such degrees. Of the total number of technicians 86.6 per cent had no diploma at such level.
- 4) For example the project Il Personale scientifico e tecnico nelle aziende italiane organised by the Centro di Ricerche sull'Economia e la Sociologia dell'Istruzione e della Ricerca (CRESIR) of April, 1968, shows that apart from questions of age, two-thirds of the jobs for which a specific training is required are held by personnel with an inadequate level of education and training.
- 5) For example the general population census of 1961 in Belgium reveals that 89.2 per cent of wholesale and retail traders with a university degree or an advanced secondary education had received either a full-time or part-time training which was not commercial or economic; in the same way 58.5 per cent of farmers with diplomas at this level acknowledged that they had not received an agricultural training.

even if it were possible to strike a perfect balance between the flow from the educational system and the requirements of the economy at a given moment the changes which occur in the structure and on the labour market would always ultimately cause a gap between the supply of specific qualifications and the demand. In the modern world where the imperfections of the educational system are now accompanied by rapid changes in ways of living this gap is very perceptible. The productive agent has to receive additions to his training which are in line with the functions he performs but not necessarily with the training he initially received.

The need to ensure the repeated readjustments which the worker of today must expect during the four or five decades of his career has led to the idea of the system referred to above, designed to ensure the continuity of education and training. The views we have outlined in this connection may be recalled. "Continued" or "permanent education" is apparently now felt to be the ideal system. Many thinkers and educational planners have fully realised the issues at stake in the last few years and have been engaged on a protracted analysis of the problem. Theoretically, the system has been thoroughly discussed but if it has not yet been translated into facts this is due to two main reasons. In the first place there may well be general agreement as to the need to set up a system to ensure the optimum utilisation of abilities by adapting individuals to changes in production processes, but the day-to-day needs of the workers have nevertheless to be satisfied as and when they arise and these two conflicting requirements have created a discrepancy between the level of specialisation of the batches of workers who reach the labour market every year and the level they would need to acquire in the light of medium-term forecasts. Secondly, the material and intellectual structures of the educational system which continues in many respects to function efficiently cannot be replaced by a stroke of the pen. The traditional education system contains a whole mass of young people at various stages of their schooling and neither syllabuses nor teaching methods can suddenly be reorganised from scratch. For these reasons continued education is a long-term problem likely to involve future generations. The formulation of policy recommendations on the utilisation of highly qualified personnel is a matter for immediate or at least fairly short-term action while in-career education and training is still, basically, an additional form of

education. This does not of course mean that the development of the idea of permanent education should not be kept under close review: on the contrary, constant attention is called for.

A word might usefully be said here regarding the terminology of the present paper. The distinction often observed between education and training will not be made here. There are two reasons for this attitude. The first is linguistic. It is due to the fact that the terms used in the various languages are not harmonized. The second reason is that for the requirements of growth and development man must be considered as a whole. Education and training interlock, influence each other and cannot be separated. A better educated individual will be more fully aware of the logic of the work he does and will want to make it more efficient. A better trained individual will often be able to make his work less arduous and devote more of his energy to self-education because he will have more leisure time and his mind will be freer(1). In any consideration of training schemes we do not of course disregard educational aspects recognising that effective training enables the individual to fulfil himself, not only as a worker but also as a human being.

B. OBJECTIVES OF FURTHER EDUCATION AND TRAINING

1. Scope of present efforts

In-career education and training schemes go back a long way and have often proved their worth in the case of manual workers or minor salaried employees. Mention may be made of the traditional apprenticeships at firm or sector level and the systems of accelerated vocational training for adults which were generally a post-war development in many countries.

On the other hand, schemes for highly qualified personnel are not so general, are not highly systematised and are not co-ordinated. Some are State-organised and some are the result of private initiative(2). The basic idea has been either:

- 1) Not to speak of the indirect effects of higher living standards due to increased productivity.
- 2) They are often a lucrative fad encouraged by delusive publicity but without any real efficiency and in defiance of sound economic principles. At various times all kinds of agencies have sprung up purporting to give a training in business management.

- to make good a deficiency where the problem is to train responsible staff from personnel who have medium-level qualifications or who do not possess the final diplomas normally awarded in the professions concerned;
 - or to ensure adaptation where there is a need for further training to enable highly qualified personnel to take on new responsibilities or be initiated into new techniques;
 - or to provide an apprenticeship, i.e. the practical preparation of graduates for their professional functions.
- But this rough and ready classification of further education and training schemes requires better elaboration.

2. Classification of objectives

For analytical purposes and in order to specify the policies to be adopted in the light of a number of structural indicators which are easily identifiable, it is possible to distinguish four major further education and training objectives. In actual fact, these four major categories are interdependent and equally significant as regards the utilisation of personnel. They are professional efficiency, conversion, induction and upgrading(1).

a) Professional efficiency

A preliminary objective of further education and training is professional efficiency which is achieved through preparation, improvement of knowledge and adaptation to the successive functions an individual is likely to perform in the course of his career. This is an essentially economic objective. The problem is to make optimum use of the individual in his contribution to production by enabling him to fulfil himself to the maximum. As regards

1) A number of more or less similar classifications are suggested elsewhere. For example the Report to the French Prime Minister under the title Recyclage des cadres et techniciens dans les industries de pointe (Retraining of Responsible Staff and Technicians in the Leading Industries) (Paris, 1969, p. 73) analyses "recyclage" as adaptation, maintenance and further training to foster development, conversion and general education. E. Staley, Planning, Education and Training for Development (Stanford University, 1968, p. 15) adopts the following terms: occupational advancement, occupational renewal, occupational transfers. The classification proposed here seems either more systematic or more complete, according to the case.

responsibility for the schemes and their cost, this objective concerns three fields of reference, i.e. the national economy, the enterprise and the individual.

Preparation for functions covers the additional training to be given to young people who have completed their studies and are taking up employment in the economy. A future system of education and training is conceivable in which the economy and the educational system would co-operate to make this stage a bridge between an almost totally unspecialised basic education and the induction of workers into a specific production process(1). However, this procedure is not in line with the present situation where most formal courses of education and training continue to be largely specialised in their later stages and the inevitable deficiencies of collective education must be remedied by personnel initiation into specific functions.

Improvement of knowledge is directly linked to economic trends. Because technological changes are responsible for the obsolescence of plant and manufacturing processes while the rise in living standards brings about a diversification of consumption and rapid changes in taste, both tend increasingly to devalue the occupational skills of industrial personnel. In view of the recurrent need for training caused by these factors, one school of thought recommends that action to deal with this problem should be integrated into a permanent system of education and training.

Adaptation to successive functions is bound up with the modern tendency towards mobility. Workers today can increasingly expect to be given greater responsibilities and make greater use of their innate and acquired abilities, enhanced by age and experience. Greater responsibilities call for an initiation into specific methods and new knowledge. Further education and training as an instrument of utilisation policy is therefore very important not only to the individual enterprise which is enabled to allocate its personnel to the posts where they will be most effective but also to the individual worker who is able in his turn to give of his best and fulfil himself in a more interesting career.

b) Conversion

At first sight the objective of conversion or reconversion is both political and social. But it should be borne in mind that the factors which make the conversion of highly qualified personnel necessary are generally of a structural nature and day-to-day

1) See Conclusions.

economic trends must not be allowed to thrust basic economic requirements into the background. This is a point which has to be made when conversion concerns either unemployed or under-utilised personnel.

Unemployment among highly qualified personnel can hardly be attributed to cyclical factors such as those which effect the employment of non-qualified personnel and manual workers. The policy of full employment, in the sense of re-absorption or prevention of cyclical unemployment, is not related to the policy of utilising highly qualified personnel, and any action to convert unemployed responsible staff by a range of anti-cyclical measures might perhaps solve specific social problems momentarily but would not be economically sound. Economic soundness calls for the efficient structuring of production in the light of present and future requirements.

The unemployment of highly qualified personnel is generally due to various structural factors. An enterprise or a regional activity may disappear; a change in production may involve the dismissal of specialised personnel; the reorganisation of a firm's management may enable it to rationalise its operations and meet competition successfully; a merger or a concentration for the same purpose may culminate in the dismissal of a number of responsible staff. In all these cases, additional training may well enable the personnel affected to be converted to other jobs either inside or outside a particular enterprise⁽¹⁾.

However, the conversion of unemployed responsible staff does not depend solely on their ability to take up new employment. It depends also on the outlook of employers and it is bound up with the general problem of older staff. A highly qualified employee who has made an effort to acquire further training may find himself competing on the labour market with newly-fledged graduates from the educational system, who have been given the same specific training. This kind of competition may result in some disquieting situations. On the one hand the young graduates may find themselves barred from the posts for which their training made them eligible and on the other hand the converted unemployed staff may find themselves compelled to take jobs at a lower salary in view of their family responsibilities.

1) In France the Centre d'études supérieures industrielles reported in October, 1968 that 90 per cent of the 150 trainees of highly qualified level who had attended its six month conversion course had found employment in the ensuing four weeks.

Where young graduates in a particular profession are a surplus on the labour market their unemployment calls for urgent additional training to switch them into an occupation where their services will be most useful. This problem is due either to a failure to forecast future requirements and guide students in consequence(1) or to a congenital weakness in the system which, while apparently fostering free access to higher education, leads young people to choose blind-alley jobs. Admittedly, employment forecasting is no easy matter. As a result of an economic or technological development, the demand for certain qualifications may rocket. On the other hand, a specific training may call for a comparatively lengthy period of study involving a definite choice five or ten years before employment can be taken up. One solution which has been proposed is to create a certain number of basic courses, common to the major occupational categories and to provide specific training in the last stage, leaving career adaptation to some further training scheme(2). A second cause of unemployment among young graduates is the chaotic demand for education and is really much more serious, as it arises not from any imperfection in methods but from a deliberate choice in which economic constraints are sacrificed to a fallacious freedom, resulting in collective waste and individual frustration.

The term under-utilised does not in this context mean partially unemployed but refers to persons whose qualifications and capabilities are not used with their maximum potentialities. Societies which have got beyond the lower threshold of development and are well on the way to sustained growth and higher living standards appear to be particularly concerned with the problem of utilisation. In the advanced countries where employment is general but people are unwilling to devote more than a limited portion of their time to production economic progress ultimately depends almost exclusively on the progress of productivity. It is obvious that the best way of promoting productivity is by ensuring that the worker is fully adapted to his task. Hence the need to ensure the occupational, functional and geographic transfers which will enable individual abilities to be used to the best advantage. It is therefore obvious that there is an inescapable link between further education and mobility.

1) See the reservations in Chapter III.

2) See Conclusions.

c) Induction of personnel

Induction is a specific factor of the two objectives of efficiency and conversion which we have already shown as interdependent. It is emphasized here owing to its present importance. The two main cases in which it is concerned are inadequate preparation and unemployment among young graduates.

When they begin their working career many young graduates are conscious of the shortcomings of their education. Even when it is not inadequate or obsolete it is often too abstract to fit a beginner for his professional work. Apprenticeship has always been an inevitable stage in a worker's career. At a time when highly qualified functions are inclined to become increasingly specialised and education is becoming more and more general and widespread the induction of young people into their working life needs to be organised.

For the reasons already outlined, i.e. inadequate forecasting, initial misdirection, chaotic demand, length of studies, young graduate specialists find themselves unemployed when they reach the labour market. This trend is likely to develop because the expansion and democratisation of education and extension of facilities due to the rise in living standards make it more difficult to select students and establish quotas. When this difficulty has not been provided for, corrective action must be taken to give young unemployed graduates rapid new training to fit them for the jobs available on the market. The organisation of this corrective action is now a vital problem, owing to the large number of students taking different educational and training courses, particularly those which are deceptively easy and attractive.

d) Upgrading

Upgrading is an aspect of the social and economic objectives. It plays the same part in industry as compulsory schooling does in education by generalising and institutionalising the access to culture. It enables all workers whatever their age to acquire the successive levels of occupational knowledge and proficiency. The resulting social progress is conducive to economic progress which is generated directly by the greater proficiency of the worker and indirectly by the stimulus to productivity arising from the prospect of better living and cultural standards. The pursuit of these two objectives must be co-ordinated in order to ensure selected upgrading in the common interest.

The idea of upgrading, which is not a recent one, would receive fresh impetus and awake new interest if it were part of a system of permanent education and training. The latter would phase the acquisition of new knowledge over an unlimited period, thus adapting the new knowledge to the situation of the community or the individual worker at any particular time. From this point of view, upgrading is bound to be a corollary to the idea of utilisation.

Upgrading is also related to the idea of a "return to school"(1) enabling every individual, whatever his age or occupational level, either to undertake or to resume a course of study likely to improve his education or provide him with some desired training. This system, on which new thinking is now being done(2) calls for a formal type of education and training normally on a full-time basis and this is not necessarily the case in upgrading schemes.

3. Shortcomings of occupational education and training

Until a system of education is introduced which is sufficiently flexible to meet the needs of the community at any moment, the problem of further education and training will be to improve the quality of recruitment and upgrading as practised by employers on a pragmatic basis. The inadequacy of current training for present-day jobs may induce employers to put their trust in the abilities of their personnel, even if those abilities have not already been fostered or confirmed by some appropriate diploma, and give them an in-service training, hoping that their subsequent experience or adaptability will make good the initial absence of the requisite specialisation(3). In this way, further education and training now tends to improve recruiting practice and career prospects and foreshadows a system of education and training in which successive types of specialisation will be acquired to meet the exigencies of the economy.

1) This system is sometimes called "recurrent education", but this is an unsatisfactory term in this case as the word recurrent, which is borrowed from the exact sciences, means periodical return or at least repetition.

2) See in particular: Recurrent Education, OECD/CERI (to be published).

3) It is, however, obvious that for certain types of training an established employee may well be passed over in favour of even a young graduate.

It is no doubt desirable from an economic point of view that the educational system, at least at its terminal stage, should provide a certain range of specialised training to suit specific vocations or abilities. Needless to say, very specialised professions, e.g. in the applied sciences or medicine cannot be based on a general education but require specific knowledge and certified proficiency at the outset. However, for improvement of knowledge in very specialised professions, for initiation into more general and interchangeable professions and for the capacity to switch from one function or profession to another, the essential need is an intellectual training designed to foster mobility and adaptability which are prerequisites for the effective working of an educational system geared to optimum utilisation. In the present state of affairs, further education and training must aim not only to provide immediately utilisable knowledge but to foster adaptability. It must be borne in mind that in any system of permanent education the latter role would be one for the basic educational system.

4. Socio-political and economic constraints

A coherent policy for further education and training is as difficult to put into effect as it is to devise. It is difficult to put into effect because it has to co-ordinate a number of specific, isolated schemes, give them a material and intellectual structure, and finance the resulting educational and training network. The policy itself is difficult to work out. It comes up against social, political and economic constraints which may well be conflicting but which have to co-exist and therefore call for an overall approach to the problem and early action of a psychological and pedagogical nature, together with the necessary briefing to rule out the likelihood of conflicts likely to consume resources and impede progress.

Socio-political constraints may be fundamental or temporary. The former arise from a desire to offer individuals some choice as to their career and place of work. The organisation of educational and training networks and the nature of the disciplines taught partly depend upon this consideration. Temporary constraints are due to traditional shortcomings, past errors and a wide freedom of choice. When the educational system produces batches of specialists in disciplines which are obsolete or surplus to

requirements, or too general, the labour market and the community as a whole become congested with graduates who are workless or dissatisfied or who vegetate in uncongenial, frustrating and poorly paid jobs. These batches of workers cannot be left to their fate and energetic action must be taken in order to retrain them under the best psychological conditions.

Economic constraints arise from the need to avoid wasting material and human resources and missing opportunities because of the inadequacy of existing structures at times when dynamic decisions are required. The establishment of further education and training networks that were not in line with the real economic needs of the community would not generate the progress by which the effort could be justified a posteriori. Economic forecasts which require continual revision if they are to be effective, must be the guiding principle behind training forecasts. Failure to recognise the need to subordinate training schemes to economic reality would merely stave off difficulties instead of solving them and would perhaps increase them until they became overwhelming.

C. FURTHER EDUCATION AND TRAINING IN A POLICY OF UTILISATION

1. Link between the two concepts

As we have already emphasized, continued training is a priority instrument in any utilisation policy. Up to the present it has been used to make urgent adjustments to meet the particular needs of individual firms or has been organised by public or private initiative, sometimes on a mercenary basis, and though perhaps efficient, has not been primarily concerned with economic considerations. Apart from this empirical aspect, it must be considered as part of a system which provides not only specific knowledge and qualifications but also a mind training enabling individuals to adapt more effectively. Conversely, the utilisation policy is the framework in which the content of further training can be worked out in the light of economic exigencies. It will in particular, outline the requirements for a policy of mobility which, as we have seen above is bound up with continued training.

2. Analysis plan

To analyse the motivations and allocate the costs of further education and training schemes, a distinction will be made between the schemes organised at enterprise level(1) and those used as an instrument in a national policy of adaptation to economic trends. In each case the following points will be examined:

- estimated requirements;
- the cost effectiveness of training schemes;
- the allocation of costs.

1) "Enterprise" is used here in the widest sense. It covers all employers, private firms or public undertakings.

Chapter II

FURTHER EDUCATION AND TRAINING OF PERSONNEL IN THE ENTERPRISE

A. INTRODUCTORY REMARKS

To define responsibilities and allocate costs a distinction is made, as we have just shown, between the further education and training of personnel in the enterprise and further education and training as an instrument in national employment policy. There is no opposition, however, between the two fields of reference, as far as their objectives are concerned. On the contrary, they are mutually supporting as the national economy is made up of all enterprises in the various sectors working to produce goods and services and employing personnel. The objectives may even frequently merge in cases where the State intervenes to foster further training at enterprise level with a view to enhancing general productivity.

Any action taken by the State at enterprise level is necessarily limited. The needs of an enterprise are multiple, heterogeneous and changing. The State cannot take on the task of satisfying this multitude of special requirements. Its most effective action is to facilitate initiative by appropriate measures (subsidies, tax relief) but these can come into play only where justified in the general interest. It may, however, be anticipated that the State will not only foster private schemes but will suggest and stimulate them. In this chapter state action will be examined only in the specific cases where it is necessary and our analysis will centre on the policy and needs of the enterprise.

The further education and training of personnel in the enterprise is a type of training which has been widely applied. It caters for several categories of personnel which will be considered in the attempt which is made below to determine education and training requirements. The following types may be mentioned:

- further education and training for specialists;

- training in management functions;
- adaptation of young graduates to their first job.

Conversion problems will not be analysed at enterprise level. The term is used here in the strict sense i.e. a change of functions accompanied by a change of enterprise(1) and its analysis falls within the scope of general employment policy.

It will be remembered that at enterprise level further education and training must also be considered in the light of its effects on the individual and his personal development. Indeed, further education and training is likely to bring the individual worker career satisfactions by enabling him to be promoted to functions which are consistent with his ambitions and abilities. He will be able to make better use of his competence, will improve his material position and in so doing will develop his personality.

B. ANALYSIS OF REQUIREMENTS: NATURE AND ESTIMATE

The idea of requirements is one of the concepts of further education and training which are least understood. It is often confused either with the record of past schemes or with projected programmes which will generally be no more than the result of phasing the budget. It is therefore necessary at the outset to emphasize the difficulty and even the impossibility of quantifying requirements for any particular type of further education and training for the personnel in an enterprise. Three kinds of principal reasons may be given for this:

a) In the first place, no one has yet defined the actual relationship between training and function. Only recently has it been statistically proved that there is a comparatively frequent discrepancy between training received and functions or occupations exercised(2) and this has caused no small surprise as it clashes with current conceptions. Future psychological and sociological analysis should endeavour to determine whether this discrepancy is due only to lack of co-ordination between the educational system and the economy or to other causes, e.g. the fact that the

1) In the widest sense conversion may also be applied to a change in functions within the same enterprise; this case will be classified here under "further education and training for specialists".

2) See Chapter I.

exercise of a function depends perhaps frequently on a chance factor due to the traditional structure of the labour market or that it is connected with the incumbent's personal abilities rather than his theoretical training. As functions are exercised by a varied group of individuals who have had different trainings and whose continued training needs will therefore be different it is not easy to quantify specific requirements by categories.

b) It may appear easier to detect requirements if their purpose is considered i.e. by investigating what may be called revealed or specific requirements. In many cases the acquisition of more modern equipment, the application of different processes and a change in management methods will call for a new type of proficiency which the personnel concerned must be given. In these cases the requirement is immediately perceptible and precise. But as soon as it has to be evaluated comprehensively in order to organise training structures considerable difficulties arise not only to quantify it at a given time but also to forecast it on a medium-term or even short-term basis. To ensure total quantification, the requirements of all the enterprises in a given district would have to be assembled by categories and these requirements are very diverse, depending on the activity, size and management of the enterprises. Forecasting depends on a correct evaluation of the future rate and volume of equipment renewal and these factors depend on the hazards of technological progress no less than on the vagaries of the trade cycle.

c) However, apart from the revealed requirements enterprises have what may be called diffuse or latent requirements. The general level of the education and training received by the personnel in an enterprise is a matter for the management's economic calculations. The estimate of requirements is bound up with the personality of the head of the firm and the firm's particular development prospects. This is apparent in the statements made by firms in reply to surveys on this subject. For example, the French report already quoted i.e. "Retraining of Responsible Staff and Technicians in the Leading Industries"(1) shows that decisions as to the retraining of personnel are taken in those industries by the management or the senior staff and the objectives expressed reflect their desire to maintain a general atmosphere of progress and development.

1) See page 58 of this Report.

As the specific requirements of continued training cannot be quantified with sufficient accuracy the most realistic attitude in view of the action to be taken is to base education and training structures on diffuse requirements which are arbitrarily fixed at the highest possible level in the light of budget resources and the desire not to hinder the rate of production. In the advanced countries a considerable effort may well be possible as the steady rise in productivity is constantly reducing work times and making it possible to devote more energy to education and training activities without encroaching on leisure.

1. Further education and training of specialists

The term specialist may be applied to personnel performing specific tasks which require special knowledge, the latter being obtainable from a school or university education or from an in-career initiation and practical experience on the job. In order to use his qualifications and abilities to the full the specialist must maintain, update and supplement his knowledge and acquire new knowledge.

a) Nature of requirements

i) Maintenance of knowledge

Certain basic knowledge is not currently used in everyday practice but may be needed in special cases. As it is required only occasionally it may begin to fade from the mind of the specialist, whose memory may also fail as he gets older. He therefore requires a refresher course which is always salutary as it enables him to understand things better by drawing on his personal experience(1).

ii) Updating of knowledge

This is required because of technological and managerial changes. If an enterprise is to make progress or merely keep up

1) This is the category to which the French term "recyclage" best applies: "maintenance and adaptation of basic training in response to technological changes". Le recyclage des cadres et des techniciens dans les industries de pointe, report by the Comité consultatif spécialisé, Premier ministre, Paris, 1970, p. 15.

with its competitors, its personnel must have access to the latest knowledge available in the various fields of production and management.

iii) Additional specialisation

When an entirely new technique is applied, personnel will require additional specialisation, i.e. new specific knowledge or an extension of previous knowledge. This is true of production techniques no less than marketing and management techniques.

iv) Acquisition of new knowledge

This is necessary when a person is called upon to take over entirely different functions from those which he previously occupied in the enterprise(1). At a high level of qualifications such changes often carry access to management functions and owing to its frequency and importance this question will be given particular attention.

b) Evaluation of requirements

The distinction which has been made between revealed requirements and diffuse requirements must first be borne in mind. The maintenance, updating and supplementing of knowledge and the acquisition of new knowledge in well-run enterprises are often precautions which are not necessarily taken in view of immediate objectives but in a process of long-term planning. It must also be noted that the scale of the demand for further education and training of specialists in enterprises obviously varies according to the economic sector, the size of enterprises and the ratio of the number of specialists of various types to the total work-force. Methodical surveys should be carried out among enterprises representative of rationally defined categories and the results of these surveys should be extrapolated at national or regional level to provide standards on which education and training programmes are to be based. At the present time the meagre information available deals with the nature rather than the scale of the requirements. A number of examples of published estimates will be found below. The figures will be found to be only tentative. They are limited to branches or even sub-branches of the secondary

1) This type of mobility may be considered as "conversion" in the widest sense although we are not using it in the present paper.

sector and are not representative enough to authorise any serious extrapolation. Nor are the criteria of assessment co-ordinated or even precise. Requirements will therefore be considered in the present paper from two points of view: the personnel and the enterprise.

i) Needs felt by the individual

Certain investigations have been made into the opinion of highly qualified personnel as to training requirements. Individual attitudes seem generally to be subjective. For example, one survey published in 1964 shows that junior executives interviewed in the Paris area(1) showed no great desire for further education and training in the years which followed the efforts they had made to secure a degree. Nor do their family worries and housing and income problems supply any incentive. Subsequently junior executives do begin to take a certain interest in further education and training but, like senior executives, they are opposed as a whole to general science and mathematics courses. There is a greater awareness of the general need for further education and training among technicians, office staff and manual workers. This information is partially confirmed by a sample survey which was carried out in July 1963 by the Office of the Prime Minister of Japan to ascertain the attitude of work people to the need to acquire further education and training(2). The awareness of this need ranged from about 85 per cent in the 20-24 age-group to 15 per cent in the 70 and over age-group rising to a peak of 86 per cent in the 30-34 age-group. Table 5, showing occupations and diploma levels, gives the replies of the categories interviewed in percentages. Unfortunately no distinction is made between the educational and the occupational aspects of training.

ii) Requirements evaluated by the enterprise

It is not possible in this basic paper to arrive at any average figure or determine any criterion of evaluation by drawing up an inventory of the studies and surveys carried out in this

1) C. and M. Durant, "L'influence des politiques de personnel sur les comportements de formation" (Influence of personnel policies on attitudes to training), Revue française du travail, July-December 1964.

2) Reviews of National Policies for Education - Japan, OECD, Paris, 1971.

Table 5
INDIVIDUAL VIEW OF THE NEED FOR
FURTHER EDUCATION AND TRAINING IN JAPAN

	Percentages	
	Need sometimes felt	No need felt
School background		
Elementary school graduates	53	41
Lower secondary school	77	20
Old-system lower secondary school graduates	75	23
Upper secondary school graduates	89	10
University or old-system college graduates	82	17
Occupations		
Managerial and professional personnel	83	17
Self-employed	67	31
Clerical and technical workers	89	11
Skilled labourers	75	21
Simple labourers	70	25
Service workers	76	19
Farmers	61	34
Housewives	66	30
No occupation	27	60
The others	79	21
Total	67.4	24.3

field. The few figures available, moreover, are always limited to special sectors or sub-sectors which are not representative of a national or regional need. They relate either to very restricted categories of personnel or else to the active population as a whole, irrespective of qualification levels. Indeed, most figures concern personnel with little or no qualifications. A further and even more important factor, as we have already noted, is that the evaluations actually express nothing more than the forecasts or projects of enterprises (generally large-scale

industrial firms), calculated on the basis of their budget appropriations and do not initially reflect the answer to an objective need.

In any case, owing to the impossibility we have already noted of evaluating the sum of the specific revealed requirements with a view to organised schemes, an estimate can only show diffuse requirements which, in this field of action, merge with localised specific requirements. To achieve a general improvement in efficiency, it is desirable that these diffuse requirements should be estimated at the highest level dictated or permitted by the social and economic constraints outlined above(1).

Generally speaking, there is considerable agreement among enterprises with the principle of further education and training for their personnel although they seem to be somewhat suspicious of any outside schemes, except perhaps as far as their top management is concerned. When senior executives manage to find the time, their employers are quite generous in sending them to take part in training seminars for managers and in defraying the often considerable costs of these activities. Tables 6 and 7 give an idea of the attitude of enterprises in this connection. Table 6 is the result of a survey among scientists and engineers in the United States and shows how the latter react to the attitude of their direct superiors in the enterprise. Table 7 summarises the data which was assembled by the survey of the Italian Government Commission on the training and utilisation of scientific and technical personnel, and shows the number of firms with or without training schemes out of the 191 enterprises with over 500 employees who sent in replies.

The report already quoted on the retraining of responsible staff and technicians in the leading industries gives estimates calculated in 1966-67 showing the demand for retraining in the French electronics industry anticipated over the next five years(2). These figures will be found in Tables 8 and 9(3).

1) See Chapter I.

2) See p. 32 of the report. It should be noted that the term retraining (recyclage) is used in the widest sense in the report.

3) These figures should be accepted with the reservations expressed.

Table 6

ATTITUDE OF ENTERPRISES TO FURTHER EDUCATION
AND TRAINING IN THE OPINION OF THEIR PERSONNEL(1)
(as a percentage of the persons interviewed)

Attitude	Scientists	Engineers
Stimulation and aid	61	49
Indifferent	34	44
Dissuasion	2	5
No reply	3	2
Total	100	100

- 1) R. Renck et al., Continuing Education for R & D Scientists and Engineers, Social Research Inc., Chicago, July 1968, p. 84.

Table 7

TRAINING SCHEMES IN ITALIAN FIRMS
WITH OVER 500 EMPLOYEES(1)

Size of the firm (number of employees)	Firms with training activities	Firms without training activities	Total
500 to 2,000	60	75	135
2,000 to 5,000	20	13	33
5,000 to 10,000	8	2	10
10,000 and over	10	-	10
Total	98	90	188

- 1) P. Polese, "The Training of Scientific and Technical Staff in Italian Firms", document No. 3 of the Conference.

Table 8

DEMAND FOR RETRAINING IN THE FRENCH ELECTRONICS INDUSTRY
ESTIMATED BY OCCUPATIONAL CATEGORIES OVER FIVE YEARS

Occupational category	Total personnel	Personnel to be retrained	Per cent
Management	221	57	26
Senior executives	1,393	1,303	68
Junior executives	6,427	3,866	60
Senior technicians	12,089	11,137	92
Production technicians	4,812	2,470	51
Total	25,442	18,833	72

Table 9

DEMAND FOR RETRAINING IN THE FRENCH ELECTRONICS INDUSTRY
ESTIMATED OVER FIVE YEARS ACCORDING TO THE LEVEL OF
BASIC EDUCATION

Percentages

Level of training	Occupational categories	
	Senior executives	Junior executives
University level	53	46
Specialised colleges	58	58
Self-taught	49	45

The most effective method of determining structural and functional programmes of further education and training is to ascertain the rating enterprises adopt for assessing the scale of their diffuse requirements and make rough deductions from these ratings. In most cases requirements are not classified by type, on the lines shown above, while estimates are of a general nature and

seem to be quantified very approximately(1). For example, there are proposals that in a specific sector "a quarter of the senior technical executives require a refresher course". It is increasingly acknowledged that professors need a sabbatical year. It is estimated that doctors need a course of continued training after "five or ten" years' practice. This procedure actually uses the best criteria for assessing diffuse requirements i.e. the desirable rate of further training. This rate probably differs from one occupation and function to another and must be determined by specialists from the sectors concerned in each case.

Assuming that this rate is approximately constant over a period for each category of personnel it is possible to quantify the need as a ratio of the number of personnel per age-group as expressed in the formula

$$F = \frac{P_1 + P_2 + P_3 + \dots + P_n}{r}$$

where F represents the volume of education, p represents the personnel age-groups and r is the rate of recurrence of education(2). The points which remain to be settled are the phasing of the further education and training and its procedure.

2. Education and training for management functions

a) Nature of requirements

Particular attention must be given to this training owing to its importance and frequency although it represents a particular case in the further education and training of specialists and

- 1) The report on the retraining of responsible staff and technicians in advanced industries gives precise figures on page 32 relating to the retraining requirements of a representative sample of French firms in the electronics sector. The criteria used in the evaluation are not stated and these figures have no representative value as far as overall requirements are concerned.
- 2) For example if this rate is five years and if it is therefore considered that training is to be provided for highly qualified personnel distributed in eight age-groups ranging from 25-30 to 60-65, we have the following formula:

$$F = \frac{P_1 + P_2 + P_3 + P_4 + P_5 + P_6 + P_7 + P_8}{5}$$

also because it cuts across the various categories of requirements outlined in this connection. It may, in fact, apply to two categories of personnel:

- i) either management specialists, in which case it falls within the schemes outlined in connection with further education and training for specialists i.e. maintenance, updating and supplementing of knowledge;
- ii) or personnel to be adapted to new functions in the enterprise. It then concerns the general problems of mobility, the latter being once again related to further education and training. Management functions are frequently taken over by specialists in other tasks either as promotion or with a view to making use of personnel who have proved successful in departments where it is perhaps planned to replace them by younger technical personnel.

One reason for emphasizing management training as part of the further education and training of personnel in the firm is the growing need for such training in all sectors and at all levels. In the modern economy production techniques are generally well understood but management methods are a comparatively recent science. Much remains to be done and this seems to be the sector from which the maximum increase in productivity may be expected.

A further reason for emphasizing the importance of this training is that it is a typical example of adult education, the adults in question having arrived at a certain stage in their career. Except for certain methods at a more subordinate level, it would seem that little significance is attached to management training in the educational system as pupils do not possess the essential experience of production and they must first acquire a good technical knowledge. The educational system should not, however, overlook the need to induce an awareness among future specialists of the importance of management problems.

b) Evaluation of requirements

According to recent statistics relating to France⁽¹⁾ about 300,000 managers and senior executives are employed in management

1) P. Bize, "Enseignement de l'administration des entreprises", (Management training), Revue mensuelle de l'organisation, March 1968.

functions in industrial and commercial firms of some size and their average age on completing their formal education is 18-20, which means that most of them received no management training. Moreover, the annual flow of graduates shows that only 10 per cent have been prepared for the exercise of business management functions. This picture perhaps reflects a traditional situation as business management methods have not been systematically taught until fairly recently. It may also reflect the mistrust of technocracy felt by men of action(1). The same statistics estimate that the French managers and senior executives who at any moment of their career would be prepared to undergo a training or further training course in modern management methods represent less than one per cent.

Even if it is acknowledged preferable to provide this training during rather than before employment, it should be placed on a formal basis and organised on a considerable scale for it represents an initiation into highly developed and sometimes intricate techniques. This seems to be recognised in certain circles of industry. In this connection Table 10 provides some interesting information relating to Japan and shows the proportion of management training in the total volume of further education and training given to the active working population with a breakdown by diploma levels. It will be seen that management training represents about 80 per cent of the total programme.

As the need for management training is considered as a diffuse requirement relating to all highly qualified personnel it may be evaluated according to the formula defined above for the further education specialists. Nevertheless, the rate of recurrence is no doubt phased at longer intervals than in the case of other training as it is kept up to date by daily practice.

3. Adaptation of young graduates to their initial employment

a) Nature of requirements

The problem is to bridge the gap between the necessarily general training provided in the educational system and the skilled training required substantially which must be in line with practical exigences. Initiation into the latter may take

1) See, for example, R. Townsend, Au-delà du management, (Beyond management), Paris, Arthaud.

Table 10

MANAGEMENT TRAINING AS A PROPORTION OF THE FURTHER EDUCATION
AND TRAINING GIVEN TO THE ACTIVE WORKING POPULATION IN JAPAN(1)

Percentages

Level of basic diploma	Labour manage- ment	Production management	Business manage- ment	General manage- ment	Total
<u>Secondary school graduates</u>					
- general	56.1	14.7	2.3	6.4	79.5
- commercial	54.8	10.8	5.0	10.7	81.3
- technical	55.4	21.0	0.8	4.2	81.4
<u>Higher education graduates</u>					
- literature	45.3	6.7	4.0	15.8	71.8
- law and politics	56.6	8.3	3.6	10.8	79.3
- commerce and economics	53.8	8.9	3.6	14.8	81.1
- science	41.4	18.2	1.5	7.4	68.5
- engineering	46.7	24.8	0.5	6.7	78.7
- agriculture	49.7	20.3	1.5	6.0	77.5

- 1) T. Wakana, "Evolution of the Structure of the Labour Force in Japan", Document No. 5 of the Conference.

several forms according to the nature of the functions the young graduate will have to perform at the beginning of his career and the degree of flexibility of the education he has received. The ideal education should open the way for the whole of the career, whatever form it takes, with adjustments for practical experience and further education and training.

This means that adaptability and receptivity to change should be assigned the same importance as any specific practical training. The enterprises most capable of providing a specific practical training for young graduates should endeavour to look beyond their own sphere of interest and acquire a broader outlook covering the whole labour market. We must once more emphasize the close relationship between the two fields of reference i.e. the individual enterprise and the economy as a whole. In the light of the foregoing considerations the analysis will focus on three

particular points: specialisation, mental adaptation and the utilisation of the products of the educational system.

i) Specialisation

The degree of specialisation in further training depends at the outset on the functions to be exercised. The nature of the functions to be assigned to young graduates must therefore be considered. Except in certain specific professions young recruits will generally be given highly specialised tasks which require few qualifications. A young doctor or a young programmer are typical of the specific professions we have mentioned. Young administrative, commercial and even technical personnel in enterprises or public services will generally be assigned to functions we have generally described above. Only subsequently will they be given tasks which call for more precise qualifications.

The degree of specialisation in further training will also depend on the individual's educational background. For certain types of employment, schools and universities provide specialists who are reasonably capable of performing the functions required but for other categories of employment this is not the case and in some cases there are no directly suitable types of background education.

This introduces the problem of the degree of specialisation which the educational system ought to provide in view of the rate at which personnel are assigned to specialised tasks on the basis of age and experience. This point will be reverted to subsequently(1). It may merely be said at this point that if the educational system were to offer a basic training and if a system of permanent education were to be set up i.e. to provide additional knowledge as and when it is required, it would be much easier to evaluate the demand for further education and training as the latter could be related to a standardized situation in which each function would carry a specific level of qualifications.

ii) Mental adaptation

We have referred to the degree of specialisation which it would be desirable or necessary to include in further education for young graduates. This point is not negligible but it is not the only point and perhaps not the most important. Initial basic

1) See Conclusions.

training may well be conceived as likely to condition the whole of a career and promote mobility, but the essential point at issue is the receptivity of the individual to the realities of his working life. The transition from school or university to the industrial world requires a re-adjustment of outlook and personal adaptation.

The importance of the problem has been recognised. Schools now try to give their pupils an advance knowledge of the environment in which they will be called upon to work. A number of very interesting schemes have been launched in this connection i.e. visits to industrial works, preliminary training periods, and "sandwich courses" as in the United Kingdom. These schemes facilitate the transition although the functions ultimately assigned to young workers will not necessarily be identical with the standard functions described. For example, it is hardly possible to prepare students for the technical and social responsibility which highly qualified personnel may have to take over because this is a matter of individual capability.

But there is a deeper reason why schemes of this kind cannot be adequate. Practical ability and working methods are the results of experience, or rather personal experience. Like specialisation, mental adaptation can only be acquired in the course of a career.

Nevertheless, if this essential flexibility of outlook is to be imparted from the earliest years, a far-reaching process of educational reform must be envisaged. Subjects are sometimes too theoretical and curricula too ambitious while teachers are exclusively the products of an academic system and are too remote from industrial life. This problem concerns not only the nature of the subjects taught but how they are taught and how the education the pupil receives at school is to prepare him for the active part he will be called upon to play later in his professional functions and the initiative he will be expected to show.

It may be concluded that the need for mental adaptation is part of the diffuse requirements which concern all products of the educational system and are, moreover, recurrent. Normally they should be satisfied by a system of permanent education. At the present juncture the problem is primarily to adjust the thinking of trainers, teachers and employers and induce them to agree that the general interest is also their particular interest.

iii) Utilisation of the products of the educational system

We have so far considered individuals whose education is designed to meet the need for the efficient performance of the functions occupied in the economic system by young graduates who have to be adapted to their working career. But the induction of young graduates involves problems which are much more complex and which arise in a field where enterprise policy and general employment policy coincide. It would be a misconception to imagine a simple employment pattern in which the flow of graduates was divided into two categories i.e. those who do not find any employment consistent with their education and are unemployed and those who are assigned to functions which are supposed to be in line with their degree and who have to be adapted to the practical tasks involved in these functions. It is a known fact that in the present state of the labour market and under present conditions of mobility the functions a worker performs are only consistent to a certain degree with the education or training he receives(1). Furthermore, there is an increasing flow of young graduates to the labour market who are difficult to classify(2) and who mostly end up by finding employment in service activities and in small businesses. It may be doubted whether they are properly used in view of their qualifications. It might be added that a degree is still too often the result of a course of study which has been decided by chance or routine and that certain personnel occupy functions for which they are ill-adapted purely because they have the degree in question and the prestige with which it is associated.

Training as part of the process of induction is a general need, whether it takes the form of an apprenticeship subsequent to recruitment, a post-school or post-university preparation for the performance of a particular job, or a retraining to absorb the flow of graduates into the economy, but it is also a specific need and its nature varies with the categories of young workers who arrive on the labour market. It calls for specific schemes in which all categories of graduates must be taken into account.

b) Evaluation of requirements

As these requirements are specific they cannot be quantified as a whole(3). An infinite number of individual and local

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- 1) See Chapter I.
 - 2) See Chapter III.
 - 3) See the beginning of Chapter II.

situations is the result of quite unconnected factors. Examples which may be quoted are the difference in nature and quality of the education and training provided by the educational system, the plethora of graduates in certain disciplines, the inadequacy of the qualifications they provide, the general decline in the level of applicants at the various stages of education due, apparently, to a considerable increase in their numbers, and the fact that certain young graduates may take jobs which carry an attractive initial salary but conceal under-utilisation. The apprenticeship given to each graduate taking up a function in the economic system is a personal question which calls for a specific solution.

In the short or medium term, the education structures organised to meet both the specific and the diffuse requirements must be based on an adequate assessment of the latter. As far as the immediate employment of graduates is concerned, an interesting scheme has been pursued in the United Kingdom since 1962. The University Grants Committee publishes information each year regarding the position of university graduates by 31st December in the year they obtain their diploma. The statistics show the number of graduates in each discipline who continue their studies, academic or other, who are employed, who are unemployed or who are otherwise not available for employment. Unfortunately this analysis gives no information of the extent to which the education received tallies with the function performed. Table 11 which is given for general interest shows the position of young graduates of both sexes between 1st October, 1968, and 30th September, 1969(1).

It will be seen from this example that the proportion of graduates reaching the labour market rapidly ranges from 43 to 48 per cent (according to their degree). If it is assumed that those who have given up their job in order to resume their university studies have done so in order to improve their proficiency, it might be calculated that the proportion of graduates from the two sources shown (including unemployed) who required further training to adapt themselves to their initial employment amounts to at least 44 per cent and 33 per cent respectively. Certain

1) The statistics cover all university graduates except bachelors of education and graduates in medicine and dental and veterinary surgery.

Table 11

SITUATION OF PERSONS GRADUATING FROM UNITED KINGDOM
UNIVERSITIES BETWEEN 1st OCTOBER, 1968 AND 30th SEPTEMBER, 1969
AT 1st DECEMBER AFTER GRADUATION(a)

Nature of degree	Under-taking further education or training	Already in employment	Gained employment	Seeking permanent employment	Percentages	
					Others (b)	Total of 2 to 6
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Graduates						
Education	59.2	-	31.6	1.3	7.9	100.0
Studies allied to medicine and health	25.0	1.7	67.1	1.2	5.0	100.0
Engineering and technology	16.6	3.6	69.9	2.3	7.6	100.0
Agriculture and forestry	34.5	1.0	53.5	3.7	7.3	100.0
Science	46.7	1.2	39.9	4.0	8.2	100.0
Social, administrative and business studies	38.5	3.1	39.9	5.8	12.7	100.0
Architecture and town planning	33.3	0.4	54.2	3.3	8.8	100.0
Literature and arts	52.2	1.5	29.8	4.3	12.2	100.0
TOTAL	40.4	2.2	42.9	4.2	10.3	100.0
Graduates with higher degrees						
Education	2.2	66.2	23.1	0.7	7.8	100.0
Studies allied to medicine and health	19.6	19.6	38.6	1.6	20.6	100.0
Engineering and technology	17.3	20.9	52.7	0.9	8.2	100.0
Agriculture and forestry	13.1	10.5	56.1	1.3	19.0	100.0
Science	29.2	12.5	48.1	1.5	8.7	100.0
Social, administrative and business studies	17.7	15.1	45.0	3.2	19.0	100.0
Architecture and town planning	9.9	21.6	55.8	1.1	11.6	100.0
Literature and arts	15.9	14.6	46.5	3.7	19.3	100.0
TOTAL	21.3	16.9	47.7	1.9	12.2	100.0

1) Calculated from: University Grants Committee, First Employment of University Graduates 1968-1969, London, HMSO, 1970.

2) Not available for the labour market and not specified.

schemes already exist for this purpose(1) generally at enterprise level. It is not possible to give a list of such schemes in the present paper but they are intended only for young graduates who have found work and this requirement, it will be remembered, relates to general employment policy.

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- 1) An experiment often quoted is that described in the document which is presented at the Conference as "The Bosworth Report" (DAS/EID/71.33). Despite its value as a study of induction, training structures and procedures it provides no information on the evaluation of requirements. In the first place, this project, which was developed in the British electro-engineering industries, concerned only 178 people between 1967 and September 1971, and, as the report states, it was not possible to give the advanced electrical machines technology course in 1971 as there were not enough trainees. Moreover, although the courses were initially designed for basic occupational training they were in fact open to employees with up to 10 years' experience. Lastly, the purpose of the course does not seem to have been adaptation to an initial job: according to the report they were trainees who still did not know what functions they would be expected to fill several weeks after their return to work.

Chapter III

FURTHER EDUCATION AND TRAINING AS AN INSTRUMENT IN THE NATIONAL POLICY FOR ADAPTATION AND PROGRESS

A. INTRODUCTORY REMARKS

The further education and training schemes considered here are not directly related to the enterprise and its personnel. As they are concerned with general requirements the task of organising and subsidising these schemes is therefore the responsibility of the government and the local authorities. In view of the nature of the interests involved, the scale of the facilities required, the scope of the necessary measures and their repercussions on the country's educational system as a whole, we shall mostly focus on the role of the State, as the other authorities have a more limited part to play as far as their competence and their ultimate objectives are concerned.

The role of the State in further education and training may either be part of a cyclical or a structural policy. As far as highly qualified personnel are concerned, the State will operate essentially if not exclusively through structural measures for two reasons:

- further training is an important cyclical regulator of unemployment among unskilled workers but not in the case of highly qualified personnel who are not normally affected by cyclical fluctuations in employment;
- where cyclical fluctuations lead to a decline or a change in economic activity and cause changes in the functions or specialisation of highly qualified personnel in individual enterprises, further training is called for at enterprise level rather than at the level of the national employment policy. It requires specific strategies rather than measures which are sufficiently general to justify direct intervention by the public authorities.

Bearing in mind the objectives of further education and training as already defined(1) i.e. professional efficiency, conversion, induction and upgrading, the nature and scope of state action can easily be defined.

a) Professional efficiency

It will be remembered that this objective is essentially economic. It is designed to achieve the optimum utilisation of the individual in his contribution to production by enabling him to use his abilities and develop his personality to the full. As we have already stated, this process includes courses to ensure initiation, improvement of knowledge and adaptation to the successive functions an individual may be called upon to perform in the course of his career. In a general system of permanent education these courses would operate automatically as part of an educational structure organised by the State as soon as the individual's formal schooling was completed, and might even be partly run by industry (which seems a desirable development). In the absence of an institutionalised system of permanent education, the initiative for these schemes has often been taken by industry while the role of the state has been to promote such initiative by creating the conditions in which it could be given effect.

b) Conversion

The socio-economic motivations of conversion(2) are, however, quite different. Highly qualified personnel may be released as a result of the closing down of a firm or the gradual disappearance of a regional activity, following measures of nationalisation, reorganisation, or concentration necessitated by considerations of economic efficiency(3). This involves a break between the highly qualified worker and his employer which is due to economic reasons, and provided the statutory requirements are adhered to on both sides the enterprise is not responsible for retraining the worker concerned or for organising any schemes required for or conducive to retraining.

1) See chapter I.B.2. - Classification of objectives.

2) The meaning assigned to the word conversion in the present paper will be recalled: a change of function accompanied by the transition from one enterprise to another.

3) The case of individuals who seek to change their present employment in order to find a better outlet for talents will be considered below in connection with social upgrading.

c) Induction

As already stated, state action becomes necessary when there is a flow of graduates to the labour market who do not possess the qualifications required by the market and therefore cannot be absorbed by industry. State action is also required to meet the problem of inducting young people who find employment outside industry and therefore cannot profit from the structure and organisation of the industrial sectors. As the enterprise is expected to provide for the professional initiation of the young people it recruits the importance of joint action by the economic sectors and the public authorities is obvious.

d) Upgrading

Upgrading is an aspect of the general policy of employment which involves the direct responsibility of the State. Its objectives are both economic and social. Up to the present it has hardly been brought into play except in the training of technicians but is an ideal which affects the community at large. From the economic standpoint it enables governments to increase the country's reservoir of skills. This preliminary objective mainly concerns developing countries, for in the already industrialised countries a shortage of skills is not felt generally to the same extent and upgrading may even entail a risk we have already emphasized⁽¹⁾ i.e. bringing the beneficiaries into competition with the growing flow of graduates. From the social standpoint, upgrading gives able but professionally handicapped workers access to the higher skills and promotes the mobility of under-utilised personnel who are anxious to make the effort to convert. Training and educational schemes to meet these various aspects of upgrading are therefore a matter for the State.

B. ANALYSIS OF REQUIREMENTS - NATURE AND ESTIMATE

From an abstract statistical standpoint it is comparatively easy to devise a method for evaluating the demand for education and training with reference to a general employment policy. In the light of a country's micro-economic structure and micro-economic organisation it is possible to determine the volume of qualifications required. The demand for training can then be calculated by

1) See Chapter I.

subtracting the available figure from the desirable figure. But in actual fact an analysis of this kind is purely theoretical because:

- no functional breakdown of average micro-economic productive units exists, according to the nature and size of units;
- if such a breakdown were available it would not suffice to show the actual level of qualifications of the personnel performing nominal functions;
- even if this information were available there is no guarantee that the personnel trained would actually perform the functions for which it had been prepared;
- the perpetual unsynchronised evolution of economic structures invariably outdates any calculations which are not on a very short-term basis.

Any attempt to evaluate requirements must therefore be pragmatic. It is more likely to result in the identification rather than the quantification of requirements and reveal differing and sometimes conflicting exigencies. Indeed, while further education and training at enterprise level is essentially concerned with the needs of the producers, a country's general employment policy is concerned with the needs of employees no less than employers. The requirements are therefore different and the ease and accuracy with which they can be assessed will vary according to their nature. The demand for further education and training among employees is quantified by the volume of unemployment, in the case of those seeking work, but is not identified by this method. The requirements of employees who are or consider themselves to be under-utilised is difficult to define and evaluate. The demand from the economy as a whole can only be ascertained from an analysis of unsuccessful applicants and on the strength of sector surveys.

In view of the impossibility of drawing up a detailed inventory of the community's needs - which incidentally, are largely satisfied at enterprise level - requirements will be evaluated, as part of a general employment policy, by detecting divergencies between the available reservoir of skills and foreseeable requirements through the analysis of overall statistics at national or sector level. However, any evaluation will have to be qualified, partly because it is not possible to assume that human behaviour is always perfectly "economic" and partly because there will be spontaneous adjustments. The following points should in particular be considered:

- i) the idea of qualification and specialisation as they emerge from the statistical parameters are inadequate. A degree parameter in particular is clearly deficient for the two reasons already mentioned i.e. (1) skilled personnel are partly self-taught or hold paper qualifications which are different from what they would logically require to prepare them for their functions and (2) that practical experience and subsequent additional training are not reflected by this parameter.
- ii) the idea of qualification is moreover relative. It cannot be expressed by the strict classification of clearly differentiated skills. The knowledge and abilities of highly qualified individuals makes them interchangeable and able to perform different functions. Many are versatile and adaptable. And their distribution in the economic system at any given time may, if it is unsuitable, be corrected by a judicious measure of mobility.

1. Raising of the average level of qualifications

a) Nature of requirements

From the standpoint of the community the raising of the average level of qualifications is the oldest objective of in-career vocational training. This policy was originally devised for the up-grading of manual workers with little or no skill. Adult training centres were set up for this category of labour in many countries and in certain cases have existed for many decades. The system was subsequently extended to higher-grade technicians. The present tendency seems to be to extend it to all levels of the active population. The thinking behind this trend is both economic and social: in the first place it is designed to improve the efficiency of industrial workers, and secondly it aims to offer more workers a possibility of acquiring a higher degree of proficiency and education.

Governments have only recently worked out overall training systems to institutionalise their responsibilities in this connection. In most cases schemes have been launched by various organisations with or without government backing. A number of tentative measures have however been taken by the State to assist workers as a whole to improve their level of skills. Mention may be made of the new policy of the Conservatoire national des arts et métiers,

a French institution over 200 years old, which has expanded its further training courses to cover senior technicians and engineers and include the provinces in its sphere of action which had previously been limited to Paris. A word must also be said of the "Universidades laborales" in Spain where courses are available up to the threshold of higher education.

At the level of the community the demand for skills is particularly strong for the general standard is low and it is not possible to satisfy quite simple immediate requirements. For example, the developing countries suffer greatly from a shortage of doctors and motor mechanics. On the other hand when the general level of education in a country is comparatively high, certain requirements cannot be defined quite so easily although they may be considerable. Certain ratios can be adopted in a number of special fields (desirable ratio of doctors per thousand inhabitants, ratio of teachers to school age-groups) but for others no actual criterion exists, for the output and the productivity of identical specialists differ according to the branches of the industry and the size of the enterprises which employ them. A country's overall requirements, in the sense of an optimum volume and optimum distribution of a given reservoir of skills, cannot be translated into precise and definite figures.

The desire felt by the man in the street for more education and better living standards on the one hand and the pursuit of steady economic growth on the other make it an essential to raise the general level of skills. But economic aspects tend to predominate over social aspects and vice versa according to the level of development a community has reached. In the less developed communities it is the economic aspects which are often given priority whereas in the more developed countries the social constraints may prevail. In the more advanced countries competition between the two aspects is undoubtedly stronger. If frustration is not to be generated, the rate of their respective progress must be judiciously regulated and an effort must be made to avoid the waste likely to arise from certain marginal disutility in the matter of qualifications(1).

1) There seems to be a certain awareness of this risk. A study by J. Frisch, "L'importance des diplômes pour la promotion" (The importance of degrees in promotion) in "Economie et statistique", No. 21, Institut national de la statistique et des études économiques, Paris 1971, shows that the possession of certain degrees may be an obstacle to advancement in a profession. Echoes of this fear are beginning to appear in the Press as evidenced by references to "the handicap of having a doctor's degree" and questions like: "are degrees a disadvantage on the market?" (Le Monde, Paris 2nd-3rd July and 3rd August, 1971).

In the developed countries which are generally well provided with skills it would seem that there is a need for an improvement in the average standard of skills connected with the organisation of production and marketing. This involves a whole system of briefing and training which affects the community at large and goes beyond the limits of the enterprise.

b) Evaluation of requirements

Here requirements are general and, normally, unlimited. The only limit(1) lies in the funds available. Modern mass media, i.e. radio and television, are means of reaching the population as a whole but they are more concerned with popular education than with schemes specific to the techniques required for the exercise of skills. The raising of the average level of skills is thus actually part and parcel of the policy of social upgrading.

For example, in France, a country where the principle of social upgrading has been strongly entrenched for a considerable time and affects a large number of people every year, a number of partial statistics are available which give an idea of the action taken under the legislation of 31st July, 1959. For the period 1967-68, Table 12 gives a breakdown of training schemes operated by the government(2), the municipalities, chambers of commerce and industry and private initiative(3), showing their level and the number of trainees concerned.

2. Conversion of under-utilised or unemployed personnel

a) Nature of requirements

For the purposes of further education and training there is little difference in the conversion(4) problems of unemployed and under-utilised personnel. When highly qualified personnel who are unemployed succeed in finding similar functions to those they previously occupied this is a case of simple mobility unaccompanied by a training effort but merely involving personal adaptation to a new working environment. On the other hand, when the employment

1) Nevertheless, the need for a certain balance between the structure of employment and the levels of skill must not be neglected if painful frustrations in social progress and productivity are to be avoided.

2) Except for the Centre national de télé-enseignement.

3) The statistics cover 212,651 people.

4) We recall the restrictive meaning given to the term conversion in the present paper i.e. change of function accompanied by a change of employer.

Table 12

SOCIAL UPGRADING COURSES IN FRANCE IN 1967-68(1)
WITH A BREAKDOWN BY LEVELS OF SKILL

Percentages			
Training	Men	Women	Total
Pre-training	5.4	4.4	8.4
Semi-skilled workers	8.0	7.1	10.3
Skilled workers	34.6	32.4	40.7
Supervisory staff	25.7	25.7	25.9
Technicians and middle management	13.7	15.1	9.8
Pre-training at higher level	4.2	5.0	2.0
Technicians and top management	8.4	10.3	2.9
TOTAL	100.0	100.0	100.0

1) Calculated from "La promotion sociale", Informations SIPA, No. 196-197, June-July, 1970, p. 55.

involves conversion and a change of function, training is necessary and it will be of the same nature as the training required for a skilled person anxious to make better use of his under-utilised abilities.

i) Loss of employment

Loss of employment may be due to a structural trend i.e. the failure of an enterprise, the decline of a sector or a region or the effects of rationalisation or a merger or concentration. It may also be due to the obsolescence of a skilled worker. An enterprise which realises that it is falling behind or fears that it is not likely to stand the pace may either retrain or renew its personnel. In the latter case, as in the case of structural unemployment, the measures adopted are a matter for the government's social policy.

When batches of highly qualified personnel become unemployed an immediate and obvious need arises. Apart from the measures designed to have a direct effect on mobility (housing policy, transfer of acquired benefits), action has to be taken to devise,

organise and give effect to schemes which will enable the unemployed personnel to acquire new knowledge in order to perform a different job. These schemes include the organisation of training networks, measures to give the country's educational system greater flexibility and the award of compensation and allowances for further training.

But intervention by the government and the local authorities should not only be curative. It must also be preventive and be designed to avoid unemployment arising from obsolescence and as far as possible reduce the time taken to provide the unemployed with alternative employment. This calls for a good knowledge of the labour market and the clear view of the whole national economy. Technico-economic forecasting, the estimation of the average level of knowledge of each category of personnel and the identification of special requirements are some of the procedures the government and the local authorities can use to brief the active population and induce it to make use of the further education and training facilities available.

ii) Unemployment among young graduates

Unemployment among young graduates may arise from a variety of causes:

- it may be due to friction on the labour market when a business slowdown discourages firms from recruiting new personnel;
- it may have deeper and more disquieting structural causes. It may indeed be due to the fact that the graduates concerned have had an education which is ill-adapted to the functions offered by employers(1);
- it may also be caused by what is often stigmatised as "wrong vocational guidance at school". In actual fact, this inadequate guidance is largely due to two factors which hardly concern the educational system. In the first place, vocational guidance can never be in perfect harmony with economic needs(2) as the functions which are likely to materialise in the future cannot be known and may well

1) The employers' requirements are often disconcerting in their apparent lack of realism. Many advertisements for responsible staff stipulate that applicants must be young but nevertheless expect them to have a wide range of qualifications and mature experience.

2) On this point, which deals with one of the major justifications of the principle of continued training, see in particular F. Nicolas, "Utilisation of Graduate Economists in the Netherlands", Background document No. 11 of the Conference.

change in the course of a career. Secondly, the freedom enjoyed by students in democratic countries to choose their studies and their profession discourages many of them from taking courses which are considered to be long and difficult. A varying proportion of those who make an initial effort finally drop out and join those who have set their sights on more accessible targets(1)

- A further cause of unemployment among young graduates may be the obsolescence of their basic training, if the latter was begun before the emergence of the economic trend which led to a decline in the particular sector(2).

Any further education and training policy must therefore not only cater for young graduates who have to be inducted into functions in the economic system, but must also consider all those who do not find the work(3) for a number of special reasons which may be summarised as follows:

- certain young people have no diploma although they embarked on a course of study and therefore initially had ambitions and a desire to improve their social standing;
- certain young people with diplomas are not qualified i.e. they have had a general education which does not fit them for any occupation or specialised function: they generally hold a degree or lesser certificate from the higher educational system or have passed one of the preparatory examinations for a diploma they have not obtained;
- some have a theoretical qualification because they have completed their studies and obtained a diploma. But the statistics of educational results justify scepticism as to the real value of the qualifications held by certain persons;
- some have an attractive qualification but are surplus to demand; when there is a surplus at regional or sector

1) In a statement to the Commission des Affaires culturelles de l'Assemblée nationale, on 20th May, 1970, Mr. M. Niveau, recteur of the University of Grenoble, pointed out that in France 66 per cent of 1st year students do not complete their studies and that 66 per cent of graduates take their degrees only after an abnormally long period. In "Plan national d'éducation permanente", *Hommes et citoyens*, March, 1968, E. Pisani also showed that 66 per cent of those who start a course of study do not obtain a diploma and that only 25 per cent of the adolescents who drop out at school do so for personal and financial reasons, whereas 75 per cent drop out because they are unable to stay the pace.

2) See Chapter I.

3) See Chapter II and Table 11.

level a solution might be sought by encouraging mobility which might be achieved by judicious methods of redistributing personnel;

- others have qualifications which are unuseable because they are out of date or because they are the result of an artificial craze unconnected with any real demand or because the disproportion between the excessive number of applicants for employment and the actual demand is so great that they cannot be absorbed by the labour market and must be reconverted. This has happened in various countries and at various times to graduates in law, sociology and psychology.

iii) Under-utilisation

Requirements are more difficult to identify in the case of the under-utilisation⁽¹⁾ of highly qualified personnel than in the case of unemployment and are just as impossible to quantify objectively. In a community geared to economic expansion whose members are constantly improving their proficiency under-utilisation must be accepted as endemic. Sometimes it becomes evident and the price paid by the individual concerned is a slowdown in his career, and his earnings, maintenance in the same function or ultimate dismissal, but this situation may well not arise. Under-utilisation may therefore be considered as a latent problem which the responsible authorities should do their best to remedy, the only limit being the cost of the remedial action in financial and other terms.

b) Evaluation of requirements

The evaluation of the total demand for further education and training in the case of under-utilised and unemployed personnel is a task which has not yet been carried out and would call for a considerable improvement in information.

The evaluation of under-utilised personnel would require:

- the establishment of a general criterion of optimum utilisation which is a fairly simple task requiring a definition of the knowledge and theoretical abilities required for each function;
- the calculation of a unit for measuring actual utilisation is a much more difficult task as this measurement unit would

1) It will be recalled that this is not partial unemployment but the inadequate use of the abilities of employed personnel.

have to relate to the abilities of the individual as well as his knowledge, as it is not possible to equate knowledge with a degree or diploma.

The approach so far made to this problem(1) has been based on partial criteria. The salary criterion in particular is a very misleading measurement, as the earnings from qualifications seem to vary widely from one sector and region to another(2).

For unemployed personnel, i.e. employees who have been laid off or young graduates not yet inducted, this evaluation would imply:

- a precise up-to-date knowledge of the number of unemployed and their qualifications;
- a knowledge of the number of jobs the economy can offer and the qualifications required.

Pending the definition and the calculation of an ideal criterion of utilisation it would, however, be possible to obtain a rough idea of overall short and medium-term demand by comparing the sector trends anticipated in government planning with the available number of qualified personnel calculated on the basis of their formal education or the functions they previously performed. This analysis would require a prior definition of employment by functions.

1) F. Kogelj, "Le degré d'utilisation des connaissances et du temps de travail des cadres hautement qualifiés dans l'économie" (The Degree of Utilisation of Knowledge and Working Time of Highly Skilled Executives in the Economy) and F. Nicolas, "The Utilisation of Graduate Economists in the Netherlands", Background documents No's. 10 and 11 of the Conference.

2) On this point see Chapter IV.

Chapter IV

FINANCIAL PROBLEMS

A. INTRODUCTORY REMARKS

At micro-economic level it may be agreed that the demand for further education and training is accurately evaluated by management being a factor in its economic calculations. In the case of the country itself, where a whole pattern of social, cultural and political needs has to compete with economic exigencies there is no such calculation. Cost effectiveness can be assessed in the case of immediate needs, e.g. those which concern unemployment among highly qualified personnel or young graduates but not in the case of latent needs and preliminary options in connection with training, growth, the distribution of the national product, the degree of state control of the economy and the balance between work and leisure.

B. COST EVALUATION

It is clear why the development of a standardized method of cost evaluation is important and various attempts have been made in this connection(1). There is no reason, in the present report,

1) In cost evaluation the following should be consulted:

- J. Mincer, "On-the-Job Training: Costs, Returns and some Implications", The Journal of Political Economy. Vol. LXX, supplement, October 1962, pp. 50-73.
- G.G. Somers, "Retraining: An Evaluation of Gains and Costs" in S.M. Ross (ed.), Employment Policy and the Labor Market, Berkeley, 1964.
- G.G. Somers and E.W. Stromsdorfer, "A Benefit-Cost Analysis of Manpower Retraining", Proceedings of the 16th Annual Conference of the Industrial Relations Research Association, December 1964.
- M.E. Borus, A Benefit-Cost Analysis of the Economic Effectiveness of Retraining the Unemployed, New Haven, 1964.

.../

to make a detailed study of these attempts and we shall merely mention the main factors to be borne in mind.

1. By firms

The cost of further education and training schemes for the personnel of an enterprise may be broken down into effective costs (direct and indirect) and potential costs.

- The direct costs include the purchase of equipment, the teachers' emoluments and the fees of training institutions. It must be considered net of any tax reliefs granted by the government to encourage these schemes.
- The indirect costs represent the hours passed in training by the personnel and by the teachers if they belong to the enterprise.
- The potential cost is the loss from the departure of any members of the personnel who decide to make use of their training elsewhere.

As an illustration, we may mention the evaluation of the funds spent in 1967 on the education and training of scientific and technical personnel in a sample collection of Italian firms with over 500 employees(1). Table 13 shows the breakdown of direct and indirect costs based on the figures expressed in national currency(2).

(Continuation of footnote from previous page)

- A. Ziderman, "Cost and Benefits of Adult Retraining in the United Kingdom", Economica, Vol. XXXVI, No. 144, November 1969, pp. 363-376.
- C. Selby-Smith, "Costs and Benefits in Further Education: Some Evidence from a Pilot Study", The Economic Journal, September 1970, pp. 583-604.
- K. Gannicott, Recurrent Education: A Preliminary Cost/Benefit Analysis, OECD-CERI document EO/71.04.

1) The Training of Scientific and Technical Staff in Italian Firms, Document No. 3 of the present Conference.

2) Ibid, Table 10.

Table 13

BREAKDOWN OF EXPENDITURE ON FURTHER EDUCATION AND
TRAINING SCHEMES IN ITALIAN ENTERPRISES

Percentages							
Size of enterprise (number of employees)	Direct costs	Indirect costs				Total	Total
		Internal training activities	External training activities				
			Instructors	Trainees	Total		
	1	2	3	4	5	6=2+5	7=1+6
500-2,000	42.2	25.2	8.0	24.6	32.6	57.8	100.0
2,000-5,000	17.3	3.8	16.7	62.2	78.9	82.7	100.0
5,000-10,000	44.8	28.6	7.9	18.7	26.6	55.2	100.0
over 10,000	23.3	34.8	6.1	35.8	41.9	76.7	100.0
Total	22.6	25.4	9.3	42.7	52.0	77.4	100.0

2. By public authorities

An abstract enumeration may be made of the factors in the cost of the further education and training schemes organised by the various public authorities (infrastructure, operational costs, subsidies etc.) The cost of the time spent on training in the case of personnel already gainfully employed should be taken into account (educational leave, for example). From the practical standpoint it would be necessary to determine the volume of budget appropriations desirable, fix the procedure for their allocation and organise a system for verifying the use to which they are put.

There are no complete inventories of expenditure on further education and training schemes by the public authorities. Even in France, one of the most advanced countries in this field, the statistics are not available⁽¹⁾ and when they are broken down by levels of training they omit mention of highly qualified personnel⁽²⁾. Table 14 following which is merely given for general

1) See the Report to the Prime Minister on the statistics for post-school and university vocational training, December 1970, page 32.

2) See "Les cours professionnels, la promotion sociale", in *Etudes et documents* No. 14, Paris, Ministry of National Education, 1969, page 37.

guidance, shows the nature of the expenditure of an official agency, the "Fonds de la formation professionnelle et de la promotion sociale", in the whole field of manpower(1).

Table 14

BREAKDOWN OF THE APPROPRIATIONS OF THE "FONDS DE LA FORMATION PROFESSIONNELLE ET DE LA PROMOTION SOCIALE" IN FRANCE(1)

Nature of expenditure	1969	1970	Percentages
			1970/1969 (1969 = 100)
Equipment of centres	22.5	32.7	234.1
Operating costs of training courses	76.9	66.8	140.1
Research	0.6	0.5	144.4
Total	100.0	100.0	161.1

1) Does not include allowances paid to trainees.

C. EVALUATION OF EFFICIENCY

The efficiency of further education and training, though a basic concept, is very elusive, and so far only partial attempts have been made to pin it down. It of course represents the additional value of personnel after further training minus the cost of training.

1. At firm level

This additional value could be measured only if it were possible to isolate the effect of further education and training from the other effects which contribute to enhance productivity, increase income and decrease manufacturing costs. This analysis which would encounter a considerable number of theoretical

1) Calculated from: the Finance Bill for 1971, Formation professionnelle et promotion sociale (vocational training and social upgrading), Paris, 1970, page 24.

difficulties(1) has never been generally undertaken. The possibility of increased value is assumed together with the assumption that if firms pursue training schemes they have a sound economic interest in so doing(2).

2. At national level

As at micro-economic level, the efficiency of education and training schemes could not be measured for any given economy unless it were possible to isolate their effect from that of the other factors which contribute to the creation and growth of the national product. An effort would have to be made to avoid adopting abstract and arbitrary assumptions which would merely distort policy(3).

D. ALLOCATION OF COSTS

To determine the allocation of the cost of further education and training two criteria must be borne in mind: educational objectives and the levels of motivation.

- 1) The procedure of equating the increase in productivity due to further education and training with the increases in the earnings of those who have benefited therefore seems an extremely doubtful method. In the first place, procedure for the determination of earnings, particularly those of highly-qualified personnel, is by no means clear nor is it at all general. Secondly, persons benefiting from a particular quantity (measurable) of further education and training do not necessarily earn more. If an increase in their earnings were automatic it would merely be a conventional measurement and would not necessarily reflect a rise in productivity: participation in a further education and training course, particularly if it represents a diffuse need, does not necessarily result in a change in the content of the function performed or an improvement in productivity.
- 2) The Retraining of Responsible Staff and Technicians in Advanced Industries, op. cit., page 84.
- 3) It has long been possible to evaluate the efficiency of education by comparing the income levels attained by educated individuals with the total sums spent by these individuals and the community to provide education. However, this method could not be used to measure the extent to which individuals are utilised in their employment. In the case of highly-qualified personnel it cannot but be repeated that many graduates do not perform the functions for which they seemed to be specifically trained. It would therefore be necessary to have statistics of employment by functions and these are nowhere available. Moreover, labour productivity, like the incidence of wage costs, varies to a large extent with the nature of the goods produced.

1. Levels of motivation

a) The individual

Two aspects must be considered. From the psychological standpoint the intellectual and material attractions of further education and training must offset the effort, loss of leisure and family inconvenience involved. From the financial standpoint it is an accepted principle that the community may intervene through its social policy to cover part or all of the cost although in certain cases a personal effort may be judged necessary. The basis of the social policy is that any effort made should not only not be penalised but should be rewarded by efficient incentives (subsidies, educational leave etc.)

b) The enterprise

The motivation of the enterprise is direct when it has to satisfy an immediate requirement on which its survival and progress depend. Even in this case the community as a whole may be concerned, where selective projects are involved, to stimulate or promote activity at sector or regional level. As far as diffuse requirements are concerned the interests of individual enterprises are ultimately indistinguishable from those of the economy as a whole. Because of the interlocking pattern of circular flow and the contingencies of mobility the country as a whole has much to gain when all enterprises in all sectors participate in the further education and training of personnel irrespective of the locality or the branch in which the personnel will be utilised in the future(1).

c) The public authorities

Further education and training schemes may of course become part of a country's economic and social policy. It has already been noted that in certain cases which at first sight appear to be matters of private interest the public authorities may have more than a supporting role to play. One such case might arise when enterprises are discouraged from taking certain types of initiative by the risk we have already mentioned of losing personnel

1) A stimulus might be provided in the form of tax reliefs granted to firms in proportion to the working hours sacrificed.

whose value has been enhanced by training. Non-governmental bodies may have motives for taking action as regards further education and training: trade associations and labour unions commissioned by their members to promote the interests of their particular branch of the economy or their occupation, local authorities, chambers of commerce and other regional bodies. The role of these organisations is generally to stimulate, encourage and subsidise.

2. Analysis by objectives

a) Professional efficiency

It does not seem fair to expect that the financial costs of additional training designed to increase labour productivity should be even partly defrayed by the individual. Where its specific needs are involved it is natural that the firm should foot the bill. In the case of the firm's diffuse requirements, education and training schemes might be financed by a contribution from firms proportionate to their personnel or turnover. But the collective interest justifies participation by the public authorities which for example might supply the necessary infrastructure. This system seems preferable to a government subsidy to enterprises which might give rise to abuses and be contrary to the general interest.

b) Conversion

Widespread unemployment is undoubtedly a matter for the government to handle in its economic and social policy. Where unemployment is very localised or individual a government concerned to promote social progress will establish or encourage a system to help unemployed persons to retrain, and also designed to cater for workers threatened with unemployment or merely anxious to change their job and acquire new knowledge. The objectives involved in the latter case are efficiency, conversion and social upgrading. Where there is no unemployment or risk of unemployment the cost of further education and training for conversion might well be borne by the beneficiaries. Even so, the extent to which it is desirable that the State should intervene to finance such schemes under its social policy would have to be determined. In none of the cases quoted can the enterprise be held basically responsible but it has every right to launch schemes on its own initiative for the training of personnel which it plans to recruit.

c) Induction

Where the problem is to give a young employee further training to enable him to perform a particular function, the cost is defrayed by the employer who is prepared to recruit the employee at his actual level of qualification. In the case of specific unemployment among particular strata and categories of young people who have just completed their studies and are unemployed owing to the trend on the labour market or the shortcomings of the educational system, retraining is a matter for the State.

d) Upgrading

Upgrading is primarily a matter of personal choice depending on the determination and energy of the individual. But in a community which believes in social progress and is anxious to make good initial inequalities it is the public authorities which may really be expected to further the process of upgrading. In this case the general principle is that the enterprise should participate in the training organisation.

E. JOINT ACTION

In practice, government action to raise the general level of qualifications is fundamentally the same as the action taken by firms to maintain, update or renew the qualifications of their personnel. In several countries governments have therefore had to devise more or less mandatory systems to co-ordinate the projects of the public authorities and individual enterprises. An outline of the main systems may be found in another report prepared for the present Conference(1). Mention may be made of the system which has been operating in the United Kingdom since 1964 under the Industrial Training Act which levies a regular tax on all employers, without exception, in each sector of activity(2). We may also refer to the French Act of 16th July, 1971 organising continued vocational training as part of a permanent education system(3).

1) Cf. Book I - Part Two - I - Overview by Léon Ter-Davtian.

2) See The Industrial Training Act - 12th March, 1964, Article 4 and "The Contribution of Industrial Training Boards to In-career Education and Training"; Document No. 13 of the Conference.

3) Journal officiel de la République française, 17th July 1971, pp. 7035 seq.

CONCLUSIONS

A. RESPONSIBILITIES FOR POLICY DIRECTION

The foregoing analysis is designed to show how the further education and training schemes organised in individual firms and under general employment policy are related to the overall educational system and indicate how the latter co-operates with industry. This two-fold relationship may be briefly analysed as follows:

- a) With respect to the general system of education, further education and training
 - is a necessary supplement to basic education and professional training;
 - is intended to make good the deficiencies in individual education and training;
 - may foreshadow a system of permanent education adapted to the evolution of modern economies.
- b) With respect to the co-operation between industry and universities, further education and training
 - represents common ground where both can meet and compare methods and results;
 - fosters a willingness to adapt education and training schemes to the exigencies of the economy;
 - combines economic efficiency with social progress.

Further education and training schemes are therefore the joint responsibility of the educational system and the industrial world i.e.:

- the educational system as such and not as a creation of the public authorities;
- industrial management;
- trade associations, labour unions and employers' organisations;

- bodies representing local interests, chambers of commerce and associations for regional expansion;
- the public authorities as trustees of the country's general interests.

B. REPERCUSSIONS ON THE EDUCATIONAL SYSTEM

There are at present two schools of thought regarding the nature of the educational system.

One holds that as acquired knowledge can be applied at different periods throughout a working career, specific training should be given when it is useful for the performance of a job. Consequently, basic education should above all be general and have no specific technical content, while the only definite choice in an educational career would concern the major subdivisions of knowledge, in the light of the pupils' personal tastes. The advantage of a system of this kind, it is thought, would be to avoid the wastage of unused training and prevent excessive specialisation likely to lead to immobility and prove an obstacle to retraining in the case of unemployment.

The other school of thought is that in-career education and training is designed to supplement the basic education and where necessary provide the trainee with entirely new knowledge unconnected with his original subject. Consequently, secondary education should begin by having a vocational content to prepare the individual for access to higher education leading to a profession. Professional and technical education would then be a component of fundamental education⁽¹⁾. From this standpoint further education and training is primarily an induction i.e. a practical initiation, or an apprenticeship to a working career and subsequently an adaptation to successive functions either within or outside the initial profession.

The most realistic solution might be to give young people a sufficiently wide and flexible basic education to adapt them to subsequent situations ("tronc commun") while reserving part of

¹⁾ A number of interesting proposals were made in this connection in the report by Recteur J. Capelle: "Les enseignements fondamentaux en vue de l'éducation permanente - Observations liminaires", (Preliminary remarks on basic education with a view to permanent education), Council of Europe Symposium on Basic Education, Salerno, 28th, 29th June, 1971.

the syllabuses for vocational training. This is obviously the conclusion which culminated in the educational bill tabled by the French Government at the last ordinary session of the National Assembly in 1970-1971(1).

C. POLITICAL ROLE OF THE PUBLIC AUTHORITIES

1. Definition of objectives

The public authorities should aim at specific and achievable objectives which cater for individual and collective aspirations on the one hand and the needs of the economy at both firm and national level. If these objectives are to be achieved and the relevant problems given a practical solution certain steps must be taken:

- 1) the jobs offered by the economic system to highly qualified personnel must be defined by functions so that the requisite training can be determined;
- 2) information regarding the employment open to highly qualified personnel must be improved in order to strike the most effective balance between the needs of the economy and the social demand for education;
- 3) the types, frequency and volume of the diffuse requirements(2) of the national economy as regards further education and training must be evaluated in order to determine the resources to be devoted to this purpose.

2. Action required

The policy of the public authorities with regard to further education and training may involve direct action or take the form of guidance and encouragement. The latter action is not solely psychological and inforamatory but also consists of concrete measures which may be listed as follows:

- 1) Cf. Assemblée nationale (française) second ordinary session 1970-1971, documents Nos. 1752, 1753, 1754, 1755, 1780, 1781, 1784, 1786.
- 2) Cf. Chapter II.

- 1) creating appropriate networks of further education and training or providing applicants with existing educational facilities;
- 2) passing legislation to encourage individuals and industrial managements to make an effort in the direction of further education and training e.g. re-organisation of working time (for example, educational leave), adoption of a system of subsidies and tax reliefs or, on the contrary, a general tax levy penalising abstention;
- 3) organising publicity and co-operation to foster and if necessary institutionalise co-operation among the various circles concerned.

3. Harmonization of policies

A policy of in-career education and training designed to satisfy the ambitions of the worker has no meaning unless it is an integral part of a general system geared to economic and social progress. There must be no mistake: after a certain stage of development has been reached this policy, like the expansion of education, will entail a risk or at least a feeling of over-qualification which is likely to lead to frustration if the division and distribution of labour are not consistent with the wishes and abilities of the workers. Serious trouble in the future can be avoided only by a resolute integrated policy of economic growth and social progress.

III

THE ALLOCATION OF LABOUR AND THE CONSEQUENCES
FOR EDUCATIONAL POLICY

by

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Summary

The present paper deals with the problems of co-ordinating manpower policy for educated personnel with educational policy. There are in principle two ways of administering the labour market for highly qualified personnel. The first is to rely on detailed manpower forecasts and structure the educational system accordingly. The problem with this approach as asserted in this paper is two-fold:

In many sectors, manpower forecasts may be very uncertain, whatever the sophistication of the approach, if substitution possibilities exist between different types of labour.

This approach tends to disregard the non-economic goals of the educational system.

The other approach is to stress that the foremost aim of manpower policy with regard to educated manpower should be to provide the clients of the educational system with relevant information about the labour market, and then, on the basis of this information, allow the clients to decide for themselves. By combining this with a more flexible school system and a larger possibility of returning to the educational system later, the conflicts which may arise between the social demand approach and the manpower approach may be partially reconciled.

The paper also discusses the present theories of the allocation mechanism for educated labour, and shows that present evidence supports the assumption of a strong degree of substitution in the labour market for educated personnel. In many cases therefore a relevant approach seems to be one which relies on the self-correcting mechanism of the market itself, where public policy concentrates on providing the most important basis for a well-functioning market: information. Manpower forecasts are still important however. They will be especially useful as control estimates for a policy based on the market mechanism. Even in the absence of fixed manpower requirements, there are still limits to what the market can absorb without disturbances.

TABLE OF CONTENTS

Introduction	287
I. Outline of the Manpower Requirement Hypotheses and the Substitution Hypotheses	289
II. Consequences for Manpower Planning of the Substitution Hypothesis and the Fixed- Coefficient Hypothesis	291
III. Empirical Evidence on the Substitution Hypothesis and the Fixed-Coefficient Hypothesis	295
IV. The Consequences for Educational Policies . . .	301
V. Suggestions for Future Research	307
VI. Some Concluding Remarks	309

INTRODUCTION

The purpose of this paper is to discuss the educational policy implications of different theories on the allocation of educated labour. To do this, the paper has been divided into five parts:

- I - The first part is a discussion of theoretical concepts used within the two main approaches to manpower planning: (a) the manpower requirements approach and (b) what we have called the substitution approach. This discussion stresses how difficult it is to maintain the hypotheses of a given requirement of educated manpower per unit of production, at least on the aggregate level.
- II - The second part deals with some theoretical consequences of the two hypotheses for manpower planning. We show by using a simplified example that to give an exact meaning to the concepts of utilisation and requirement, relative wages for different types of educated labour and the relative supply of each type of educated labour must be brought into the analysis.
- III - In the third part we review some recent empirical work on these problems, where the conclusion is drawn that this work strongly supports the substitution hypotheses.
- IV - The fourth part contains a short discussion of the implications of these findings for educational policy and manpower planning, and argues that the most efficient instruments to secure a better fit between manpower requirements and the educational system are a flexible school system and extensive labour market information for the clients of the educational system. The manpower approach, the rate-of-return approach and the social demand approach are not regarded as competing tools for educational policy, but rather, in an uncertain world, complementary approaches to a difficult problem.
- V - The fifth part contains suggestions for further research, where we stress the need for job requirement studies.

OUTLINE OF THE MANPOWER REQUIREMENT
HYPOTHESES AND THE SUBSTITUTION HYPOTHESES

The manpower requirement hypotheses have taken many forms, but central to them all is that there is some kind of fixed relationship between the educational qualifications of the labour force and the output of the production sectors. The simplest form has been to assume, even on the aggregate level, a fixed coefficient relationship between education and the level of production, i.e. that for each unit of production there exists a given requirement for educated labour of a certain type. A more elaborate form assumes a fixed coefficient relationship between production and occupation and translates occupational requirements into educational requirements via the observed distribution of education within each occupation(1). A limited form of substitution has been assumed in some manpower studies. Layard and Saigal(2), for example, assumed that for a given output of each industry, there is a certain range of feasible educational compositions of the labour force which will satisfy labour requirements. But once a particular technique has been chosen, this will simultaneously determine the requirements for each type of skill, output per worker and capital per worker, i.e. for a given technique there are no possibilities of substitution between levels of skills.

The substitution approach rejects the notion of fixed relationships between the need for skills and the production of output, by stressing the substitution possibilities between different types of educated labour and between labour and capital. We may distinguish between direct and indirect substitution:

- 1) Forecasting Manpower Needs for the Age of Science, OECD, 1960.
- 2) P.R.G. Layard and J.C. Saigal, "Educational and Occupational Characteristics of Manpower: An International Comparison", British Journal of International Relations, July 1966.

a) Direct substitution between different skills

A given amount of type i labour can perform a given work equally well as a given amount of type j labour. In general the two amounts will be different. If they are indetical, we say that there is perfect substitution between labour of type j and labour of type i in this given type of work.

b) Direct substitution between labour and capital

A given unit of production may be produced with much labour and little capital i.e. labour-intensiveness, or with little labour and much capital, i.e. capital-intensiveness. This will imply a different utilisation of skills in the two situations.

c) Indirect substitution

i) There is substitution in the demand for different consumption goods. Even if there were a fixed requirement for each type of skill in the production of each consumption good, we would still observe substitution between skills if these fixed requirements varied between consumption goods.

ii) Substitution between domestic production and imports. As in case (c) (i) this also implies substitution between skills even in the case of fixed requirement of skills per unit of production as long as skill requirements vary from industry to industry.

The consequence of this discussion is that in order to assume that there is a well-defined requirement for manpower on the aggregate level (i.e. the level to which most studies have been confined) for each unit of production, a necessary condition is not only a fixed coefficient relationship in micro, but also that these coefficients are the same for all industries in the aggregate¹⁾. Thus, the a priori reasons against the manpower approach are in general very strong.

1) For a full discussion of the necessary and sufficient conditions for establishing these kinds of relationship, see Blaug M.: An Introduction to the Economics of Education, London, 1970.

II

CONSEQUENCES FOR MANPOWER PLANNING OF THE SUBSTITUTION
HYPOTHESIS AND THE FIXED-COEFFICIENT HYPOTHESIS

To illustrate some consequences of these two approaches, we shall examine Table 1 where it is assumed that different types of labour can substitute each other. For the sake of the illustration we limit ourselves to a situation in which four types of labour are distributed between four jobs(1). The total requirement for labour in each of the jobs N_1 , N_2 , N_3 and N_4 is assumed to be known. We shall not in this connection go into the considerable difficulties in determining these numbers(2). We shall only discuss the following limited problem: given that the overall need for labour in each job is known, can the requirement for for each type of labour be determined?

TABLE 1(*)

Education	Job I	Job II	Job III	Job IV
(U) University	X	X		
(S ₁) Upper-level Secondary		X	X	
(S ₂) Lower-level Secondary			X	X
(P) Primary				X
Number of Persons who are required in each job	N_1	N_2	N_3	N_4

*) Copied from Magnussen and Thonstad: On the Concept of "Need" for Types of Educated Manpower, Nordic Seminar on Forecasts on Educational Development and the Labour Force, 1968.

Note: X means that the specific type of labour can perform the indicated job.

- 1) By job, in this example, we mean a narrowly defined work function.
- 2) One way of determining these numbers would be through an economic model in which the total need for labour in each job were solutions of the model.

In Table 1 university graduates can perform jobs I and II. The table indicates a limited degree of substitution since e.g. job II can be performed by both university graduates and people with upper-level secondary education but not other types of education. We shall now show that, with the existence of substitution possibilities, it is not possible to derive a specific number for the need of each type of educated labour.

Let U stand for the number with university education, S_1 , S_2 and P for people with other types of education. By looking at Table 1, we see readily that we have the following inequalities:

$$\begin{aligned} U &\geq N_1 & U + S_1 &\geq N_2 & N_1 + N_2 &\geq U \text{ which gives us } N_1 + N_2 \\ &\geq U & U &\geq N_2 - S_1. \end{aligned}$$

From this we can see that we are not able to determine the need for university-educated personnel, but are only able to derive upper and lower bounds $N_1 + N_2$ and N_1 respectively. In addition we get another lower bound which depends on the supply of people with upper secondary education. The reason we get intervals for the need for educated manpower is that we have assumed substitution possibilities. If we had complete substitution, i.e. crosses in all boxes in Table 1, we would only get intervals of the type $0 \leq U \leq N_1 + N_2 + N_3 + N_4$. In the input-output world, i.e. no substitution, with crosses only along the diagonal, the need for each type of educated personnel would be unequivocally determined once we knew the N 's. The larger the degree of substitution, the larger the intervals. In the end, the interval will be bounded by zero as the lower limit and the total demand for labour as the upper limit. The above illustration is admittedly very simple, we have for example assumed that when substitution possibilities exist, the different types of education are equally efficient. But the table serves to illustrate the following facts in the case of substitution possibilities:

a) That needs for educated manpower can only be meaningfully defined within fairly wide limits and so the usefulness of detailed manpower forecasts becomes very questionable.

b) The actual distribution of the labour force according to education will depend on the relative supply of people with different educational backgrounds(1).

1) Another assumption underlying this exposition is the assumption of flexible relative wages. If wages are rigid, we are back in the fixed-coefficient case.

c) The concepts of "need for", "use of" and "required level of education", can only be defined in terms of both demand and supply relationships.

Within this theoretical framework it is no longer meaningful to compare the use of a certain type of labour in a number of countries, and draw conclusions from such observations on the "need" or "utilisation" of the type of labour in question, without considering the history of educational development in the countries concerned. Thus, if in two countries one uses more of one type of labour than another, both being at the same level of economic development, e.g. as measured by labour productivity, one cannot draw the conclusion that this type of labour is better utilised in the country which uses less, or that the "needs" for this type of labour are represented by the country which uses less. It might happen that the relative supply of this type of labour is higher in the country which uses more of this type of labour. The higher relative supply leads to lower relative wages and therefore to use of relatively more of this type of labour, a prediction which would actually follow from economic theory in the case of efficient use of labour. When the history of educational development and/or relative wages for the same types of labour in the two countries are different, conclusions concerning needs or utilisation of a certain type of manpower cannot be drawn on the basis of only a comparison of relative use of this type of labour in the two countries.

These statements would not be true if one accepts the underlying assumptions of the input-output analysis. Even if substitution possibilities might exist per se, there are sectors where no reliable measure of output exists. The health sector and the educational sector are good examples of such sectors. In these sectors the demand for labour of each type is determined by fixing educational norms for each type of job. Very often these norms are determined in such a way that only one type of educated labour can fulfil them (one cross in each box of the table). Here we have the fixed-coefficient case: the requirement for each type of educated labour can be determined directly from the total manpower requirement and in this case the concept of need is meaningful without any reference to relative wages or prices(1).

1) Note that need in this context is conventionally determined.

We have shown that in a labour market with substitution possibilities and flexible prices⁽¹⁾ the manpower needs of the economy can be satisfied or be compatible with different distributions of people by educational background. (It means in effect that the need for detailed manpower forecasts as a guide to educational policy becomes less important.) If, in addition, the individual demand for education does not coincide with the manpower forecasts, which we suspect is the general case, and the actual size and structure of the educational system is based on these forecasts, social welfare will be reduced. The reduction in social welfare is due to the fact that the individual demand for education is not satisfied, even if this demand in many cases could be compatible with the manpower needs of the economy. There is therefore considerable scope for allowing a high degree of freedom of choice between different educational paths without this leading to unemployment for some types of labour and shortage of others.

1) The case of inflexible prices can be treated in the same way as the input-output case.

III

EMPIRICAL EVIDENCE ON THE SUBSTITUTION HYPOTHESIS AND THE FIXED-COEFFICIENT HYPOTHESIS

We have already discussed some consequences for educational policy when there are substitution possibilities in the labour market. In order to assess the importance of these consequences it is necessary to give a review of the conclusions of some of the more important empirical evidence on the allocation process for different types of labour.

The experience of the MRP(1) which was undertaken by the OECD in the beginning of the 1960s provides relevant information on the possibilities of manpower forecasting, and thus indirectly on the existence of substitution possibilities for educated labour and the "match" between occupations and education. R.G. Hollister(2) undertook an evaluation of the MRP Project and his conclusions can be summarised as follows: the study indicated that as much as a 20 per cent change in requirements for higher education in the MRP plans would result from allowances for substitution possibilities. In other words, there were indications of a wide range of choice among patterns of educational outputs which were compatible with a given set of economic targets. This analysis further showed that the first results of estimates of required educational outputs for some of the MRP plans were highly sensitive to the assumption about occupation-education relationships and the role they play in determining the change in the stock of education embodied in the labour force. Evidently the supply of educated labour of different kinds had some influence on the occupation-education relationships which suggests substitution possibilities between different kinds of education.

1) Mediterranean Regional Project.

2) Hollister, R.G.: A Technical Evaluation of the First Stage of the Mediterranean Regional Project, OECD, 1966.

Probably the most ambitious undertaking to test the underlying assumptions of the manpower approach is the OECD study: Occupational and Educational Structures of the Labour Force and Levels of Economic Development (OECD, 1970). This is not the place to dwell on the methodology of this report, suffice it to say that the authors tested relationships between occupational and educational structures, and the level of economic development represented by the level of labour productivity. In addition they also presented relationships where the total supply of different types of educated labour was added as an independent variable(1). In assuming a linear relationship in the logarithms between occupational and educational structures in the different industries and on the national level and the labour productivity, one implicitly rules out the possibilities of substitution. It is fair to say that the results showed that this assumption alone had little explanatory power, and thus the overall result is a rejection of the manpower requirement hypotheses. But by adding the total supply of different types of labour as an independent variable, the explanatory power of the relationship was greatly improved in terms of conventional statistical measures. This suggests that the supply of educated manpower has a strong independent influence on the allocation of educated manpower in the economy(2). But for this to be possible there must exist substitution possibilities between different types of manpower(3), and relative wages must play a role in the allocation process. Thus, the negative conclusion, as far as the fixed-coefficient approach is concerned can be turned into a positive conclusion when it comes to possibilities of substitution. Strangely enough, the authors do not draw this conclusion, however. On page 63 in the second volume of the report, "Further Analysis and Statistical Data", they argue: "We acquired the conviction that substitution

- 1) In some connections they also introduced a variable representing the capital employed, but this is not central to our argument here.
- 2) The graphs representing the relationship between income per employee and the use of different types of labour show such a wide dispersion in most cases that an inspection of these alone effectively rules out the manpower requirements hypotheses.
- 3) This could be due to indirect substitution; i.e. fixed-coefficient relationships on the micro-level. It is unlikely however that the influence of the total supply of educated manpower on the actual allocation of skills would be strong if that were the only reason for substitution.

in all its forms was not a valid explanation ... As regards levels of education, we have repeatedly noted that a country 'under-educated'(1) at one level is 'under-educated' at other levels; the assumption that one university graduate can be 'replaced' by two or three people who have completed their secondary education is, in fact, never confirmed." This is hardly a satisfactory explanation. First of all, an analysis which does not regard substitution possibilities as an explanatory factor at all, cannot reject it as such. Secondly, this way of arguing neglects the fact that the outcome of an economic process is usually influenced by both supply and demand conditions. It is true there is evidence that countries which are below average in the supply of secondary education are in general also below average in the supply of university graduates. (Output from one level is input into the levels above.) Thus, one should expect that countries which are "under-educated" at one level are also "under-educated" at the next, which is only a consequence of the supply conditions and not at all a rejection of the substitution hypothesis. But the whole notion of "under-educatedness" is false. It neglects the fact that other inputs, i.e. capital and natural resources, also influence the level of labour-productivity. An obvious explanation for so-called "under-educatedness" may therefore simply be a larger endowment of natural resources and a higher capital-labour ratio which compensate for a relatively low educational attainment(2). It also neglects the fact that those countries which are "over-educated" might be so for other than economic reasons.

The conclusion is that this report which set out to explore the realism of assuming a direct relationship between the level of economic development and the educational structure of the labour force, has, in fact, rejected this assumption. It has, however, strongly suggested that the alternative explanation is that there is a high degree of substitution in the labour market and that relative wages play a role in determining the observed pattern of allocation.

- 1) By "under-educated" in this context is meant a country which on a certain level of economic development has a lower proportion of highly-qualified manpower than the average for countries on this level of economic development.
- 2) An illustration, although perhaps an extreme example, is afforded by Libya with a national income per inhabitant equivalent to Great Britain but with a 95 per cent illiteracy rate.

The same conclusions as we have drawn here are reached in a study by G. Psacharopoulos(1). By using a more sophisticated technique than the OECD study on more detailed data he nevertheless concludes that "the proportions of qualified manpower employed by different establishments are not statistically associated with (practically) any of the variables examined" (p.17). He goes on: "I would interpret this finding as evidence of the existence of high substitution possibilities between graduates and non-graduates. The important issue which concerns us as educational planners is not so much what this case of substitution is due to, as the fact that it exists" (pp. 18-19). A third study from the U.K.(2) which examined the relationship between educated manpower and economic performance at the plant level failed to find any evidence that graduates are "required" to produce a given output.

While these studies provide us with powerful albeit indirect evidence that substitution possibilities exist, there is only scattered empirical evidence through direct statistical analysis of the relationship between relative wages for different types of educated labour and the pattern of allocation of educated labour. Nevertheless, these findings are important enough to be considered.

For a number of countries, Samuel Bowles(3) has studied the relationship between relative wages and the relative distribution of different types of labour, distinguishing between those with zero to seven years of schooling, those with eight to eleven years of schooling, and those with twelve or more years of schooling. Using the log-ratio of the amount of one type of labour to each of the others as the independent variable and the log-ratio of wage rates for the same types of labour as a dependent variable, he found for the countries concerned that this wage ratio was almost independent of the distribution of labour by educational

1) Higher Education Research Unit, Manpower Studies Programme: What Have We Learned From the LSE Industrial Manpower Project? London, 1970.

2) P.R.G. Layard, J.D. Sargan, M.E. Ager and D.J. Jones, Qualified Manpower and Economic Performance, London, 1971.

3) Planning Educational Systems for Economic Growth, Harvard, 1969.

categories. This suggests a very high degree of substitution(1). If one calculates the "elasticity of substitution"(2) on the basis of his data, one arrives at an estimate of the elasticity of substitution between well-educated (above eight years of schooling) and less-educated (below eight years of schooling) of about eight. This is very high indeed, especially if one takes into consideration that the Cobb-Douglas production function has an elasticity of 1, and the fixed-coefficient approach gives an elasticity of 0. Even if one removes the effect of substitution via final demand, we are still left with an estimate of about six, which still suggests a very high flexibility in the labour market.

Finis Welch(3) in a study of the process of labour allocation in US agriculture arrives at a point estimate of the elasticity of substitution at close to 3, which also suggests a high degree of flexibility. This estimate refers to the substitutability between college graduates and labourers with conventional skills.

We conclude this section of our review of empirical evidence by mentioning Selowsky's(4) estimation of the elasticity of substitution among various pairs of types of labour, classified by

- 1) The higher the elasticity of substitution, the higher the elasticity of demand for a factor and the less the marginal product of the factor will vary with the amount of it available. When we then assume, as we have done in this paper, that factors are paid according to their marginal product, relative wages will reflect marginal productivity. If relative wages for different types of labour are independent of the supply of the different types of labour, then these ratios will also be independent of the latter.
- 2) The elasticity of substitution (as measured in the references used here) is not the static concept which only refers to two factors in a given production process. In fact the "elasticity of substitution" which is estimated in the above context, reflects the combined influence of the partial elasticity of substitution between two different types of labour, the degree of complementarity of substitutability between each of the two types of labour and the excluded factors of production and the differences in technology and the composition of final demand. The elasticity of substitution measures the influence of percentage changes of relative wages in percentage change in the relative use of factors of production. When this elasticity is 3, it means that when the wage ratio increases by 1 per cent the factor ratio will decrease by 3 per cent. 3 per cent less (relatively) of the factor which has become more expensive will be used when its price has increased (relative to the other wage) by 1 per cent.
- 3) Welch, F.: "Education in Production", Journal of Political Economy, January 1970.
- 4) Referred to in Bowles op. cit., p.55.

years of schooling, in 59 US manufacturing industries. The data were taken from the US Census 1960. For all the nine cases estimated, the elasticity of substitution was greater than six at the 95 per cent significance level(1).

Another method which can be used to reveal substitution possibilities and which is potentially very fruitful is to investigate the actual use of labour in very narrowly defined work functions, i.e. micro-studies. There do not, to my knowledge, exist many studies on this, largely because of data problems. Here I shall report on two, one German and a study from Sweden(2). As the German study is presented here at the Conference, I shall not go into detail on it, but only point out that the study concludes that there is a broad interval of substitution possibilities for different types of technical personnel. The Swedish study is a study of the wages of different types of educational backgrounds within certain occupations in Swedish industry. It confirms the existence of a fairly large substitutability and in addition gives information on earnings for the different educational backgrounds within each occupation. The pattern of earnings seems to be related to the productivity of each educational qualification.

Our review of recent empirical evidence, based on, in our view, a balanced selection of empirical analysis, leads to the rejection of the manpower approach as the only basis for the size and structure of the educational system. The evidence points to a large degree of substitutability and a marked influence of earnings on the allocation of labour, and this ought to be reflected in a sound educational policy.

- 1) A very recent study (unpublished) by G. Psacharopoulos at the University of London, using the same method as Samuel Bowles on 32 countries, arrives at an estimate of the elasticity of substitution at around 3.
- 2) The German study: Ingenieure und technisches Personal im deutschen Maschinenbau, ein Beitrag zur Analyse und Prognose des Einsatzes von und Bedarfs an hochqualifizierten Arbeitskräften is presented to the Manpower Conference; the Swedish study is by Anders Klevmarken: "The Structure of Wages for Managers in Swedish Industry", Report of the Statistical Institution, University of Stockholm, 1968.

THE CONSEQUENCES FOR EDUCATIONAL POLICIES

The evidence that the economy can easily absorb very different distributions of manpower by types of education(1) leaves the policy-maker with a freer hand towards other goals of the educational system. Thus, the case for planning based on satisfying individual aggregate demand is strong, since very different compositions of the stock of labour by educational types will leave the labour market undisturbed. In other words, estimates or forecasts of the aggregate individual demand for education (social demand) ought to have a strong influence on the actual size and structure of the educational system.

If however an efficient allocation of labour is considered a goal for the educational system, there are clearly limits to educational expansion at least in the short run. One will need a yardstick which measures whether educated labour is efficiently employed, and in this case, in view of the empirical evidence, one is left with the cost-benefit approach as the main tool. This method is also called the rate-of-return approach, since it essentially measures return over cost. We are here concerned with the social rate-of-return which ideally measures the real benefits to the economy of investing in different types of education(2).

- 1) Note that this holds in situations of fairly full employment in industrial societies, nor would we expect that the economy in developing countries where structural unemployment is a serious hindrance for economic development, could easily absorb very different distributions of manpower. (See concluding remarks).
- 2) Note that the private rate-of-return, i.e. the average benefits to individuals, may be different from the social rate-of-return. If it is higher, this may indicate that the price of education is too low, i.e. more people will want education than is compatible with the present social rate-of-return. In this case we assume that some kind of rationing takes place, so that the actual provision of places is guided by the social rate-of-return. Note, however, that this is an inefficient procedure. On the other hand, if it is lower, this may indicate that the price of education is too high, i.e. the economic benefits for society are higher than the average individual benefits.

An important assumption underlying the rate-of-return approach is whether wages for educated personnel really reflect their marginal product. In fairly large sectors of the economy, i.e. the public sector, this is obviously not true, since it is impossible to measure the output of, say, governmental services. However this difficulty does not arise in large sections of the private sector where wages tend to reflect their marginal product. We do not, of course, expect or imply that wages equal marginal products exactly(1), but if the predictive power of a model where firms act as if marginal productivity were equated to wages is satisfactory in a broad sense, the assumption will be accepted(2). The number of studies based on this assumption is enormous, and it is fair to say that the general relationship, at least on the industrial level, between factors of production and their prices is such as predicted by theory. In this case, the relative wages of different types of labour will reflect the real scarcities in the market, and since the wages of one type of educated labour represent most of the opportunity costs of another type of education, it will often be sufficient to follow the development of relative wages in order to have a yardstick of the profitability of different kinds of manpower(3).

Leaving aside those sectors where the manpower requirement hypothesis assumption is appropriate, there are, as mentioned above, limits to what the economy can absorb of different distributions of educated manpower. If, then, the size and structure of the educational system is also based on satisfying aggregate private demand, then there is clearly a need for policy instruments which, to a certain extent, can make the flows of students and graduates compatible with the manpower needs of the economy. We believe that two such instruments exist in (i) an effective information system within schools on labour market conditions and (ii) a flexible schools system.

- 1) In fact, due to the existence of on-the-job training, wages should be somewhat lower than the marginal product, but the relationship between them positive.
- 2) For direct positive evidence on the relationship between wages and marginal products, see Y. Aberg: Production and Productivity in Sweden During the Period 1861-1965, Stockholm, 1969. For other evidence, see Røder: Aspects of Labour Economics, NBER, 1962.
- 3) Current wage surveys, however, on the relationship between wages and education for different age-groups would very easily give the rate-of-return to different types of education the ratios of institutional costs between the different types were constant.

In order for this information system to be effective it must concentrate on giving information on wages and other benefits from work to the clients of the educational system. The belief that information on wages and other benefits in different occupations and/or different types of education influences the supply of students to different types of education clearly rests on the assumption that people are partly guided by labour market conditions when they decide on a specific educational career. We use the word partly, since casual observation will suggest that this is far from being the only explanation. Empirical evidence from the US suggests that people are guided by income considerations(1), but then the US has an exceptionally good information system within the educational institutions on market conditions for educated labour. There is no direct evidence, to my knowledge, from Europe on this problem, which is probably explained by the fact that the necessary data do not exist(2). In Europe it is sometimes argued that students do not take incomes into account when deciding on careers. This may well be correct but there is a good case for saying that this is so because the information on income prospects for different educational backgrounds is weak. In this case such a large degree of uncertainty may exist that even if people acted on some subjective estimates of income prospects, the probability of being wrong would be so great that if one examined data ex post one could very well arrive at the conclusion that wages or incomes are not arguments in the demand function for education(3). In addition the school systems are in many countries so rigid that even if one wanted to change one's educational career on the basis of new information this would not be possible without considerable loss of time. But as existing evidence suggests that people take income into account when

1) Blank and Stigler: The Demand and Supply of Scientific Personnel in the U.S., Chicago, 1957.
Becker: Human Capital, 1964.

2) See however G. Psacharopoulos and K. Hinchliffe: Rates of Return, An International Comparison, where they present rates-of-return for secondary and higher education for the years around 1965 for a number of countries. For the developed countries it seems that the demand for education (as a proportion of the age-groups) is roughly compatible with the rates-of-return in the different countries.

3) This refers especially to educational backgrounds on the same level - say, medical doctors and lawyers. As regards education on different levels, people obviously know that doctors earn more than road-sweepers, to take an extreme example.

information on it exists, we believe that through an extensive information system on labour market conditions an instrument exists which will have some influence in guiding the supply of people towards those educations which offer the highest rewards. The benefits from work are only partly related to wages and incomes, however. Benefits other than wages must be clearly included in information provided to the clients. Only then can we hope to guide people towards those educations which offer the highest rewards(1). This will evidently increase the degree of efficiency in the allocation of educated labour(2).

We need however, to combine this instrument with a more flexible organisation of the educational process. By a flexible school system we mean a system where the possibilities of changing educational paths within the system are large, and where the content of education stresses the general aspects of education as opposed to the more narrow and specialised kinds of education. Especially for educational careers which require long training, there is no possibility of taking into account new information on labour-market conditions if the educational paths are very rigid, or adapting to a new situation if the education is very specialised. In the case of rapid technological change the social costs involved in changing occupational career will be less in the case of general training than special training. Thus, the need for a better utilisation of educated manpower provides a powerful argument for late specialisation and for general as opposed to specialised education.

In addition to these instruments, there is on-the-job training which today is mostly provided by firms to fit education to the job-function. Studies of age-education-earnings relationships suggest that formal education and on-the-job training are complementary in the sense that firms will spend more on training a person the higher his level of formal schooling(3). In addition

1) Note that since many of these benefits are non-pecuniary, even for a market in perfect equilibrium there will be differences in income between occupations requiring the same educational level. The reason is that the non-pecuniary benefits will vary from occupation to occupation.

2) If educational policy is adapted to rates-of-return, it might also lead to a reduced dispersion of earnings, since the earning differentials relating to certain levels of education are likely to diminish. Blaug, Peston and Ziderman: The Utilization of Qualified Manpower in Industry, OECD, 1966.

3) See Mincer: "On-the-Job Training", Journal of Political Economy, 1962, and "The Distribution of Labour Incomes", The Journal of Economic Literature, March 1970.

to the arguments set forth above, the existence of on-the-job training and its relationship to general education also weakens the case for detailed manpower planning.

To obtain the necessary information and diffuse this information through the educational system one clearly needs a much closer co-operation between manpower authorities and educational authorities, and much better knowledge of the whole process of allocation of educated labour. Information on earnings for different types of labour must be collected regularly by the use of surveys and this information regularly fed back to the educational system.

The basic philosophy underlying this paper is that by restricting educational choice by students on the basis of detailed manpower forecasts, which are said to represent economic needs, one considerably reduces social welfare. This is so because these estimates will certainly turn out to be far off the mark, since in fact, as we have shown, the economy is probably flexible enough to allow for a wide range of distribution of labour according to educational backgrounds. By allowing people a freer choice, social welfare is increased and by the use of the instruments proposed, i.e. information about labour market conditions and a flexible school system, compatibility between private demand for education and the manpower needs of large parts of the economy is in many cases ensured. While present manpower analysis is conducted in a form which has only slight relevance for the clients of the educational system, the present proposal aims at establishing a mechanism for labour market analysis, the most important task of which is to inform these clients who are the people really in need of this kind of information.

In our view this provision and feed-back of information must become an integral part of educational planning. In a system where people have a high degree of freedom in choosing educational careers this will be the most important instrument open to us in matching the requirements of the economy to the individual aggregate demand.

This does not however rule out detailed manpower forecasts in sectors where established norms are the basis for manpower requirements or where we know that the fixed coefficient assumption is realistic for technological reasons. Examples are sectors like education and health. In these sectors manpower forecasts should be combined with the manpower consequences of present

demand trends. Information on excess or shortage should be fed back to the educational system. Regulation of earnings can be used to adjust demands in these sectors. Such exercises can also be undertaken in sectors where there is substitution between different types of manpower. By combining estimates of students' demand with cost-benefit analyses, one can arrive at statements like: the present trend in demand for education of type A is likely to depress income for labour with education A(1). In addition, manpower forecasts and rate-of-return analysis may supplement each other in the sense that one can be used as a check on the consequences of the other. If, for example, rate-of-return analysis gives a pattern of educational expansion which differs by 20-30 per cent, say, from the pattern resulting from manpower forecasts, there is probably a need to look closer at assumptions made in the particular case. In a world of uncertainty we need to bring as much information to bear on our policy decisions as possible.

However we need to mention one problem connected with making manpower forecasts for the public sector. In this sector the total requirements for labour are politically determined. Thus manpower forecasts for this sector may take the character of forecasting political behaviour. To surmount this problem a number of "calculation examples" may be provided for the total manpower requirement showing the consequences of different political decisions. In this way it is possible to arrive at a set of forecasts which are politically feasible.

The position taken by some writers that forecasts of individual aggregate demand for education, rate-of-return analysis and manpower forecasts do not exclude each other, but rather support one another is also the position taken here(2). This increases however the need for a much deeper study of the working of the labour market, and a more thorough co-ordination between manpower policy and educational policy than exists today(3).

- 1) To be able to arrive at a conclusion like this, however, much more research is needed on the allocation mechanism of labour.
- 2) See especially M. Blaug: "Approaches to Educational Planning", in *The Economic Journal*, 1967.
- 3) Note that we are calling for a more thorough co-ordination in the sense that more information about labour-market conditions is made available to the clients of the educational system. We are not arguing for a kind of co-ordination which makes educational policy a subsector of manpower policy. Education serves goals other than the satisfaction of economic requirements.

SUGGESTIONS FOR FUTURE RESEARCH

Empirical analysis of substitution possibilities should be a very important part of this research, and may take two forms:

- a) Analyse the market data for an industry and try to estimate the parameters in production functions where different types of labour are specified. The marginal productivity for each type of labour can then be estimated, and also elasticities of substitution between different types of labour.
- b) The most promising avenue of research is however probably micro-oriented research. One can start by describing the different functions of the different jobs. One makes a decision as to which education is the most efficient for each job-function and in this way one may arrive at a picture of the type of education which is best suited for the job as a whole, which is next best suited, etc.

It is also important to make a survey of those jobs for which one kind of education is absolutely necessary, and for the types of jobs where a certain class of education is needed, etc. By following this strategy it is possible to find those areas in which substitutability between factors exists. It is probable that by doing job studies one may be able to construct a substitution table like the one presented above and thereby arrive at estimates of the limits within which the distribution of labour on educational backgrounds is compatible with an efficient utilisation of manpower.

- c) Research is also needed on the factors of supply of educated manpower, i.e. which factors influence the choice of educational careers and the relative importance of these factors.

VI

SOME CONCLUDING REMARKS

The policy recommendations arrived at in this paper implicitly assume that the total aggregate demand for labour in the economy is equal to, or greater than, the total aggregate supply of labour, i.e. a full-employment economy, or that structural unemployment does not exist. Should there be general unemployment due to under-utilisation of capacity or structural deficiencies in the development of the economy, there is not much one can do with the instruments proposed above to prevent unemployment among qualified personnel. In this case most of the unemployment among qualified personnel is due to the same factor as general unemployment, i.e. a deficiency in aggregate demand or structural disequilibrium. It is only in a full-employment economy that one can hope to avoid unemployment or shortage among this group by using the instruments proposed here.

7

IV

INTERNATIONAL MOVEMENTS OF SCIENTISTS AND
ENGINEERS IN THE 1960s AS AN ASPECT
OF THE MOBILITY OF HIGHLY QUALIFIED
MANPOWER

by
the Secretariat

Summary

The "Brain Drain" was regarded as a very serious problem in the OECD countries during the sixties. The 3,000 odd publications indicating the interest aroused by this question often generated a good deal more heat than light.

In 1965 the OECD therefore set out to survey international movements of scientists and engineers between Member countries measured both in terms of stocks and flows. Although relatively few Member countries undertook full surveys a quantity of migration data was amassed. A report was issued⁽¹⁾ which described the main statistical results and which made a first attempt to examine migration as a special case of mobility of HQM.

The present paper, which has been prepared by Miss A. Young of the Science Resources Unit, is based on the results of the OECD survey supplemented by later studies.

The paper begins with a short theoretical description of migration as a factor balancing supply and demand for scientists and engineers. Migration is a form of mobility. Mobility means changing jobs. International migration thus means people changing countries when they change jobs and studying migration means examining the "pull" and "push" factors which determine the volume and direction of these movements.

Mobility is first examined in a closed national system. The supply of QSE in a closed system is rather inelastic in that the major element of change is educational output which depends on decisions taken at least five years previously.

Demand for scientists and engineers is much more volatile and may vary considerably with changes in educational policy, science policy and in the general economic situation.

1) The International Movement of Scientists and Engineers,
Y. Fabian, G. Muzart, A. Young, OECD.

At any one time, therefore, supply and demand may not be in equilibrium. When supply exceeds demand there will be unemployment and "outward" and "downward" mobility of QSE. In the reverse situation salaries will rise and there will be "upward" and "inward" mobility into science and engineering occupations. In addition to these types of mobility caused by specific imbalances there will always be a certain number of scientists and engineers who change their jobs as part of "normal mobility".

Even when overall supply and demand are balanced, problems will arise because neither are homogeneous. Various breakdowns of each are examined and the conclusion is reached that the three main threads in the pattern are (1) Ph.D.s/teaching/basic research/universities. (2) Scientists/teaching/research/education and government sector. (3) Engineers production/experimental development/industry. Lack of equilibrium in any of these can only be balanced by mobility into or out of one of the others.

The actual degree of mobility which occurs can be affected by a number of social, psychological and legal factors. Two characteristics of mobility are noted, that it usually occurs early in the career and by short stages, rather as a pawn moves on a chess board.

In an open international system, excess supply may be absorbed by emigration and no longer result in unemployment, while excess demand may be balanced by immigration. A country's migration can, however, be compared with its balance of payments in that it will not only reflect national disequilibria but will also be subject to the impact of changes throughout the world. Thus, even a country where supply of highly qualified manpower balances demand may find itself with positive or negative migration balance for scientists and engineers as a result of "push" or "pull" situations in other countries.

All migration is not caused by specific "pushes" and "pulls" for scientists and engineers. There will always be a certain amount of "normal circulation", for instance of scientists and engineers sent abroad on business. In addition, in the past, large numbers of scientists and engineers were forced to migrate as a result of political persecution.

The paper stresses the importance when examining emigrating scientists and engineers, of taking into consideration all four flows involved, immigration and re-emigration of foreigners and

emigration and repatriation of nationals. Examination of only one of these flows, for instance inflow of foreigners, may be misleading.

There are a certain number of barriers to international movements which determine its level and type within a given supply/demand situation. The most important are migration regulations which tend to favour the entry of the more highly qualified especially from developing countries. In addition common language and cultural ties may affect the direction of flows.

The motives of individual enterprises in hiring foreigners and of scientists and engineers who migrate are also examined, notably the question of "centres of excellence".

The paper concludes by outlining the main statistical results of the OECD survey. The main conclusion on the "Brain Drain" was that although during most of the 1950s and 1960s demand for scientists and engineers in the United States outran supply the quantitative role of immigrants was overestimated. Relatively speaking there were actually fewer foreign scientists and engineers in the United States than in a number of other industrialised Member countries. In fact a number of the latter notably Sweden and Switzerland and to a lesser extent the United Kingdom had overestimated their losses considerably. Not only did a significant proportion of their emigrants to North America ultimately return home but they had themselves acquired significant numbers of foreign scientists and engineers mainly from adjoining countries. The paper notes that emigrants to the United States were notably eminent academics and young Ph.Ds. It is arguable that these classes have always had a high rate of "normal" international mobility which was exacerbated by the unprecedented level of Federal funding of research during the late 1950s and early 1960s. The paper concludes that although the "Brain Drain" appears, at the time of writing, to be a phenomenon of the past, if and when scientific activity picks up it may begin again.

The Appendix contains a short description of the results of the surveys which Member countries undertook as part of the OECD study together with a number of tables, many of which have not previously been published, and a list of statistical sources.

TABLE OF CONTENTS

Introduction	319
Chapter I	
THE ROLE OF MIGRATION IN BALANCING STOCKS AND UTILISATION OF SCIENTISTS AND ENGINEERS	321
A. The Concepts Involved	321
B. Mobility in a Closed National System	323
C. Mobility in an Open System	328
D. The Main Conclusions of the OECD Study	333
Chapter II	
MAIN RESULTS OF THE OECD STUDY	337
A. North America	337
B. Other Large Industrialised Countries	350
C. Selected Smaller Industrialised Countries	357
1. The Netherlands, Sweden and Switzerland	358
2. Ireland and Norway	362
D. Spain	364
Statistical Appendix	365

INTRODUCTION

In the middle 1960s a great deal was written in European Member countries about the "Brain Drain", usually on the basis of a rather simplistic and often alarmist analysis of United States' gross immigration data. In general most of the 3,000(1) odd books and articles available at that time generated a good deal more heat than light though some of them contained individual interesting insights or facts.

In 1965 OECD set out to provide a background of fact for the controversy which was then reigning by encouraging Member countries to undertake statistical surveys of the migration of scientists and engineers. The original perhaps overambitious aim was to draw up a quasi-worldwide balance sheet for net migration of scientists and engineers measured both in terms of stocks and flows. In the end the quantity and quality of the data received was such that it was not meaningful to discuss migration of QSE in a vacuum without taking into consideration both total migration flows and the general problems of the utilisation and mobility of HQM. The final study prepared by the Science Resources Unit(2) concentrated, therefore, on putting the United States statistics into perspective by comparing them with similar data on selected other Member countries. The study also made a first examination of movements of QSE as a special case of "mobility" drawing on examples from a wider range of Member countries. As work was going on elsewhere on the special problems of migration from developing countries(3) the report concentrated on movements between industrialised countries.

- 1) Brain Drain and Brain Gain, bibliography on the migration of scientists, engineers and students, S. Dedijer Lund, 1967.
- 2) International Movements of Scientists and Engineers, Y. Fabian, G. Muzart, A. Young, OECD.
- 3) The International Migration of High Level Manpower: Its Impact on the Development Process: The Committee on the International Migration of Talent, New York, 1970.

The present short paper prepared by Miss A. Young of the Science Resources Unit is largely based on the work undertaken for "International Movements of Scientists and Engineers" supplemented by results from more recent publications, and is mainly concerned with migration as a special case of mobility of Scientists and Engineers, especially between highly industrialised countries. It consists of a short theoretical description of the role of migration in balancing supply and utilisation followed by a more factual chapter summing up what happened in the 1960s in selected Member countries.

Chapter I

THE ROLE OF MIGRATION IN BALANCING STOCKS AND UTILISATION OF SCIENTISTS AND ENGINEERS

A. THE CONCEPTS INVOLVED

Without fully entering the realm of technicalities it is, perhaps, useful to outline the main concepts involved.

Migration is a form of mobility. By "mobility" we mean changing jobs. At macro-level it is the process by which the pattern of utilisation of HQM adjusts to marginal changes in supply and demand. At micro-level it is the way in which most scientists and engineers pursue their careers. In the past a change of "job" normally involved a change of employer. With the increase in the size of firms and other employing organisations this is no longer necessarily true.

International migration just means people changing countries when they change jobs. Like total mobility it can be examined at the macro and at the micro-level. At macro-level this means looking at the overall "pushes" and "pulls" which determine the level and direction of migration. At micro level we have to examine how these "pushes" and "pulls" are experienced by individual employers and employees, how they respond to them and what are the barriers to adjustment.

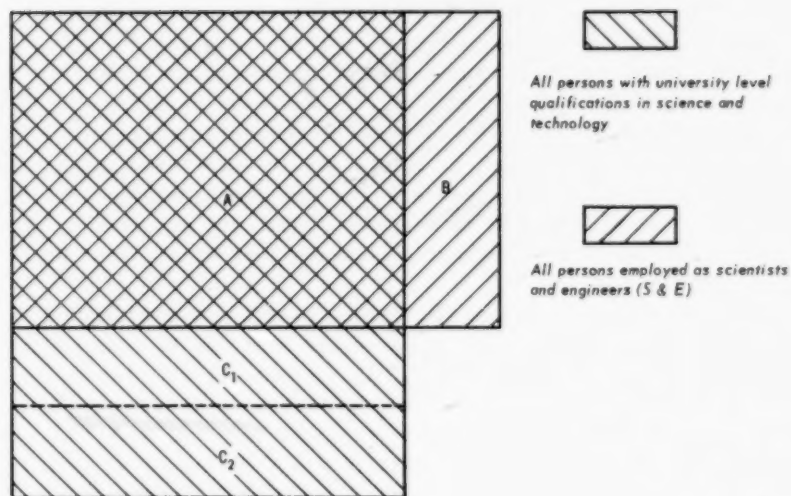
This paper is primarily concerned with natural scientists and engineers. When the standards were being chosen for the original OECD study, there was some controversy about whether the "qualified as" or the "working as" approach should be used. Graph A shows the difference between the two concepts.

There is obviously a very large overlap between the two concepts⁽¹⁾ and a majority of those concerned will be found in

1) For further discussion of the definition of "qualified as" and "employed as" see Chapter IV of "The Measurement of Scientific and Technical Activities", "Frascati Manual", OECD.

the double hatched area A. QSE employed as S and E. If, however, we are looking for evidence of shortage or of oversupply then it is very important to know the relative size of the two marginal single hatched areas, representing people who have been upgraded to S and E jobs without having a qualification and people who have a science or engineering qualification but are not making use of it. Thus we need to know about the whole hatched area.

Graph A
THE CONCEPTS OF "QUALIFIED AS" AND "WORKING AS"
SCIENTISTS AND ENGINEERS



AREA A : QSE employed as S & E.

AREA B : S & E without a university level qualification in science and technology.

AREA C : QSE not employed as S & E, of which :

C_1 : QSE in other employment (technicians or outside science and engineering) or unemployed.

C_2 : QSE out of the labour force (students, housewives, retired, etc.).

B. MOBILITY IN A CLOSED NATIONAL SYSTEM

At macro-level

Before introducing the problem of migration it is useful to start by discussing a closed national system.

Between two points in time the marginal increase in demand will be equal to replacement for withdrawals plus net new demand (or less net new redundancy). The marginal "natural increase" in total stock (whether in or out of the labour force) will be equal to new qualifications less deaths.

The level of total stock in a closed system is largely fixed by long term factors. Even the marginal changes in new qualifications will be the result of decisions made at least three to five years previously. Trends in educational output and the underlying factors for the changes observed have been discussed at length in other OECD publications(1). The general results of relevance to the present note are that there has been a rapid increase in overall output from higher education in most Member countries since the war but that this has been accompanied by a "trend from science and technology". During the 1960s the number of students going on to post-graduate education increased and output of Ph.D.s. grew.

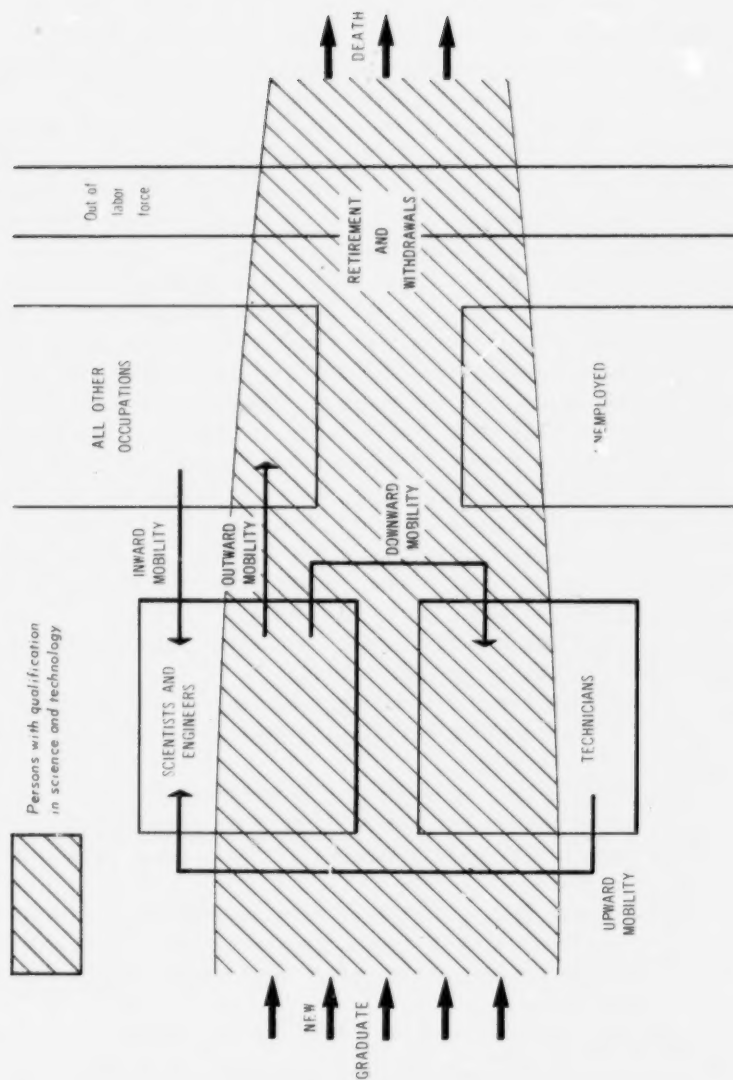
The level of demand is more volatile. Demand for scientists and engineers has three main strands:

- i) demand from universities and schools for teaching and research which varies with overall trends in the education system.
- ii) Demand from industry for productive or research and development activities financed out of its own funds which responds to changes in the overall economic climate.
- iii) Demand from industry or from government for research and development production or contract work supported by government which varies with changes in government policies.

All are capable of quite rapid change, especially ii) and iii).

1) Educational Expansion in OECD Countries since 1950, Volume II of the Conference on Policies for Educational Growth, OECD, Paris, 1971, and Development of Higher Education 1950-1967, Statistical Survey, OECD, Paris, 1970.

Graph B
STOCK AND FLOW OF QSE IN A CLOSED NATIONAL SYSTEM



At some times therefore, marginal supply may exceed marginal demand and other times the reverse may be true. In a closed system, when supply of QSE is acutely in excess of demand, a high level of unemployment should occur. In less obvious cases there will probably be high retirement and withdrawal rates and the rest of the disparity will be balanced by mobility, either "outward mobility", that is QSE taking jobs for which their qualification is not directly relevant and "downward mobility", i.e. QSE taking technician jobs.

The symptoms of the reverse situation where demand exceeds supply will be unfilled vacancies, low net withdrawals and the type of mobility to occur will be "upward mobility" (technicians promoted to S and E jobs) and even possibly "inward mobility" into some S and E jobs by non-scientists.

Theoretically some adjustment should also occur via "prices" i.e. scientists' and engineers' salaries. Thus if QSE are in short supply their salaries should grow more rapidly than the national average whereas if there is oversupply their salaries should grow less quickly. If, however, there is a general shortage of manpower or general unemployment the price element may be very difficult to identify, particularly where there is a significant level of inflation.

"Normal circulation"

Of course, the total number of job changes involved in the adjustment at micro-level to a new pattern of utilisation of QSE will be much higher than the net changes at national level.

Even in an equilibrium situation a certain number of QSE will change their jobs. This rate of change, which can be measured at various points of the system, may be termed "normal circulation"(1). It is most important to distinguish between "normal circulation" and mobility caused by special pressures.

At micro-level

In fact an overall complete equilibrium situation giving the best possible utilisation of the nation's stock of QSE will never arise because neither supply nor demand are homogeneous.

1) For a further discussion of "normal circulation" see Persons with Qualifications in Science and Technology 1959-1968, DTI, London, 1971

The four main characteristics of the QSE's available as supply are their level and subject of qualification and their length and type of work experience. An additional important psychological characteristic is what kind of job they would prefer to hold.

Without attempting any systematic "job evaluation" in the field, it seems that the main aspects of demand for scientists and engineers are:

1) The type of activity

The three main activities of QSE are research and experimental development (R and D), teaching and activities connected with industrial (or agricultural) production.

2) The type of job

The three types of job are administering one of the above activities, performing it in a professional capacity and aiding as a technician.

3) The field of science

It will probably be rather difficult to assign each vacancy to a single field of science. In recent years perhaps 70 percent of employment for scientists has been in inter-disciplinary fields. Thus for each job there may be a requirement for a specific mix of qualification and experience but there may also be a number of other qualifications which might be acceptable. Thus in engineering there may be a vacancy which could best be filled by an electronics engineer but for which a physicist would be acceptable.

4) Sector

Scientists and engineers are mainly employed by industry, by government and by the education sector.

Although all these aspects could theoretically occur in a large number of combinations, demand actually falls into three broad categories:

1) Ph.D.s

Demand for Ph.D.s. comes very largely from universities for teaching or for R and D and especially for basic research.

ii) Other scientists

The demand for other scientists is generally more widely spread than that for Ph.D.s. both in terms of employment and activity though the largest single source is probably still the education sector.

iii) Other engineers

Most of the demand for engineers comes from industry for production and allied functions, and also for R and D. In general industrial demand puts more emphasis on experience than on formal qualification.

Over time the pattern of demand changes as some sectors, activities or fields rise or decline. Thus, at any one time there exist both vacant (or badly filled) science and engineering posts and unemployed (mal-employed) scientists and engineers and a partial redistribution of scientific and technical manpower is needed.

Nor will this necessarily be only a temporary phenomenon. Not only is supply of a given type of specialist very inelastic in the short term, particularly in countries where specialisation begins very early, but there is no effective self regulating system by which supply will adjust to demand. Although governments may try and direct educational output in favour of certain fields this has generally been rather unsuccessful.

The degree of mobility which actually takes place will depend on whether or not there are significant barriers to change between the activities/sectors/fields/employers, etc. These barriers are often practical, for instance pension rights may not be transferable, salary levels may be different, previous experience may not be relevant or acceptable. Sometimes, however, there are psychological barriers to mobility, particularly between sectors notably industrialist, distrust of the "academics" and university graduates' over-evaluation of the research and dislike of the "profit motive".

Two general characteristics of mobility of QSE can be distinguished. Firstly that most job changes are made early in the career, secondly that mobility usually occurs in terms of one characteristic at a time.

One way to see the system is to imagine a multidimensional chess board with the QSE as pieces and with the size of the different squares (for example management of basic research in the

chemical industry) expanding and contracting with changes in demand. The pawns (education output) set off from Higher Education. The engineer pawns usually make a big first move (out of education into industry) as do some of the first degree scientists. Most Ph.D. pawns make only a small first move, staying in the Higher Education dimension but shifting to teaching or to basic research. From where onwards the moves are either part of "normal circulation" or are dictated by the expansion or contraction of individual squares or of the whole board, "pushing" or "pulling" the pieces in one direction or another. On some boards there may be barriers to certain moves (institutional rigidity).

In general an individual move is made in one dimension only. For example, an engineer might move from working on development project in the aircraft industry to managing a development project in the same industry or a scientist might change from doing agricultural applied research in a university laboratory to doing similar research in a government establishment.

Both "normal mobility" and a change in demand will set off a series of these individual moves. Obviously when the director of a laboratory retires he is not replaced by a new graduate. This one vacancy will set off a chain of promotions and job changes. Similarly if the government launches an oceanographic programme this will create "x" new jobs for people with relevant experience. Again a chain reaction will begin which will only ultimately create vacancies for new graduates.

C. MOBILITY IN AN OPEN SYSTEM

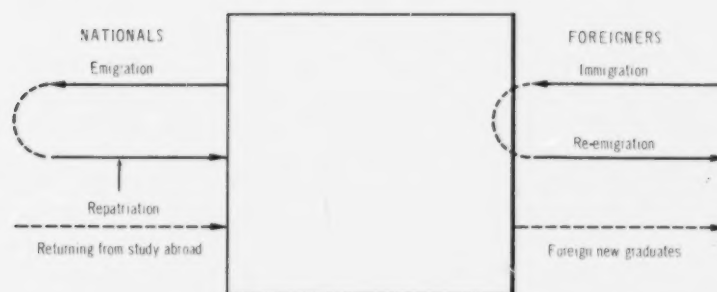
At macro-level

Once we open up the system to allow for migration the matrix becomes rather more complicated even at macro-level. Not only do we have to allow for inflow and outflow of scientists and engineers but also for two classes of scientists and engineers, "nationals" and "foreigners"⁽¹⁾.

1) According to the standards laid down for the OECD study foreigners were persons who completed their secondary education abroad. This has the advantage of excluding from "foreigners" those who migrated early in life as part of family migration but still includes those who go abroad for further study.

It is most important to take into consideration all four flows. The gross data for "immigrant" foreigners often quoted for migration to the United States or Canada tells only one part of the story and can be misleading.

Graph C
MAJOR MIGRATION FLOWS



In addition, in some Member countries a significant number of "foreigners" graduate from national universities each year. These foreign new graduates will not have appeared as QSE in the immigration data and so if, as is generally intended, they go home on completing their studies there may be apparent net emigration of foreigners over a long period. Similarly, countries where it is traditional to go abroad to take a first degree could appear to have a long term net inflow of qualified nationals.

Given the possibility of migration, oversupply or "push" should result in emigration rather than in unemployment and excess demand or "pull" in net immigration. The symptoms of "push" will therefore be net emigration of nationals and of foreigners and total re-emigration of foreign new graduates. The symptom of "pull" will be low international mobility of nationals, new immigration of foreigners and a high rate of "retention" of foreign new graduates in the country.

However, the migration balance may be compared to the balance of payments in that although a major disequilibrium within a country will certainly be reflected in its balance of payments,

the latter is also subject to the effects of independent changes elsewhere in the world. Thus, even a country where marginal supply and demand for QSE are broadly in equilibrium may find itself with a negative or positive migration balance as a result of a strong "push" or "pull" situation for scientists and engineers elsewhere.

In addition, to "push" and "pull" systems specific to QSE there will also be overall "push" and "pull" factors at work in the countries involved which may add to or counterbalance the specific QSE pressures.

A special case of a "push" or "pull" situation which is not connected with the supply and utilisation of QSE is "forced migration" which may be due to political causes, such as the restriction of freedom of a particular group of people or even persecution including bans on employment in certain professions. In this case the emigration of scientists and engineers is part of general migration but may still be considerable. Thus, in the two years between winter 1932/3 and winter 1934/5, 1,145 university teachers left Germany (14.5 per cent of all university staff) mostly for the United States. Another source estimates that 7,622 university staff left Germany and Austria between 1933 and 1939(1). Other cases were for instance the massive emigration after 1945 from the Baltic States to Sweden, the United States and Canada and the Hungarian emigration of 1956/7. When attempting to analyse the role of migration it is necessary to try and identify the number of these force migrants as they may confuse the issue.

Another special case of "push" and "pull" occurs between high-living standard countries which have an "immigration" tradition and low-living standard countries in areas with an "emigration" tradition. The high migration flows from the latter to the former will normally carry a certain number of scientists and engineers along with them almost independently of the specific situation for scientists and engineers in the two countries. For this reason it is always useful to compare flow of scientists and engineers with total migration.

"Normal circulation"

At international level there will also be an element of "normal international circulation" which will include both scientists and engineers who often go abroad on business (civil

1) Abwanderung Deutscher Wissenschaftler, Muller-Döhn, 1967.

engineers, surveyors for petroleum companies, etc.) and scientists and engineers in fields where a period of work abroad (with a change of employer) is part of the normal career. These "normal" migrants can generally be expected to return to their country of origin.

One of the key points of the discussion of "Brain Drain" in the 1960s was the question of what part of the flow of scientists and engineers to the United States should be considered as "normal circulation".

The "barriers" to international migration

The "barriers" to international migration operate more like dams or filters in that only a certain amount and certain type of people can pass through. The main filters are countries' immigration regulations. In addition to area quotas of various kinds these very often contain clauses concerning the occupation of the immigrant usually favouring the entry of the most highly qualified. For instance, during much of the 1960s the United States immigration regulations favoured the entry of Europeans but placed strict quotas on Asians. The Asian quotas were always over-subscribed and since "preference" was then given to more highly qualified applicants, the percentage of scientists and engineers in all migration from Asia was as high or even higher than in immigration from Europe.

Other filters are language and cultural ties and transferability of qualifications or of field knowledge. (Knowledge of physics for instance is transferable because the nature of the phenomena involved does not vary from country to country, but knowledge of law is rarely transferable.) Geographical proximity also plays a part.

The operation of these filters means that international movements of scientists and engineers whether "normal circulation" or resulting from "push" or "pull" tend to occur not in all directions but on a series of interlocking "circuits" of countries with similar languages and cultural backgrounds and historic political ties. There is for instance, clearly a Balto-Nordic circuit which adjoins a Germanic circuit of Austria, Germany and Switzerland. Similarly there is an "Anglo-Irish" and Commonwealth circuit which links, via Canada, with the "North American"

circuit. Each of these circuits tends to operate round one richer, scientifically advanced country such as Sweden or the United Kingdom.

At micro-level

At micro-level we add the new dimension of "abroad" to our imaginary chess board and a new set of pieces, "foreigners".

When the barriers to international movement are slight, the pieces on the board may make international moves, particularly if there are internal barriers to mobility within the countries. Here again they will probably move in one dimension only (e.g. applied research in Canadian firm to applied research in United States firm).

What are the factors which will create a "pull" situation where employers are willing to give jobs to foreigners or even to import foreigners specially to fill certain vacancies? Obviously if general demand (vacancies) exceeds supply (educational output) in a particular field then employers will be willing to take foreigners. However, even if new graduates are available, employers may prefer to take immigrants. This is particularly true in industry where experience is at a premium and where salaries are fixed in the market place. If a firm can get a foreigner with precisely the background required at less than the going national rate then it will take him direct for the job rather than having to arrange a series of transfers or to try and bid someone away from a rival company. Similarly other sectors, notably education, may take foreigners because the salaries they offer are below the national average and do not attract nationals.

What are the circumstances in which foreign scientists and engineers will be tempted to go abroad and work in a foreign country? Whilst for "ordinary" scientists and engineers the main motive for changing their job whether nationally or internationally will typically be salary, career prospects and status in the community, for the very high-level scientist or engineer, working in R and D especially in basic research (or in high-level teaching) there will be another very important factor, the relative "excellence" of the centres concerned in his particular field. The possibility in terms of equipment and of independence to pursue the project of his choice or that of working in a team or for a scientist of world renown may outweigh the purely "economic" factors such as salary.

D. THE MAIN CONCLUSIONS OF THE OECD STUDY

The main statistical conclusion of the OECD study was that although during most of the 1950s and 1960s demand for scientists and engineers in the United States outran supply, especially between 1957 and 1967, the role of immigrants had been overestimated. In the 1950s most of the excess was mopped up by promotions and by immigration over the border from Canada. Though immigration increased rapidly during the 1960s, in 1966 a peak year, foreigners were only 5-8 per cent of all scientists and engineers in the United States as against over 10 per cent of national stock in Canada and in some smaller Member countries.

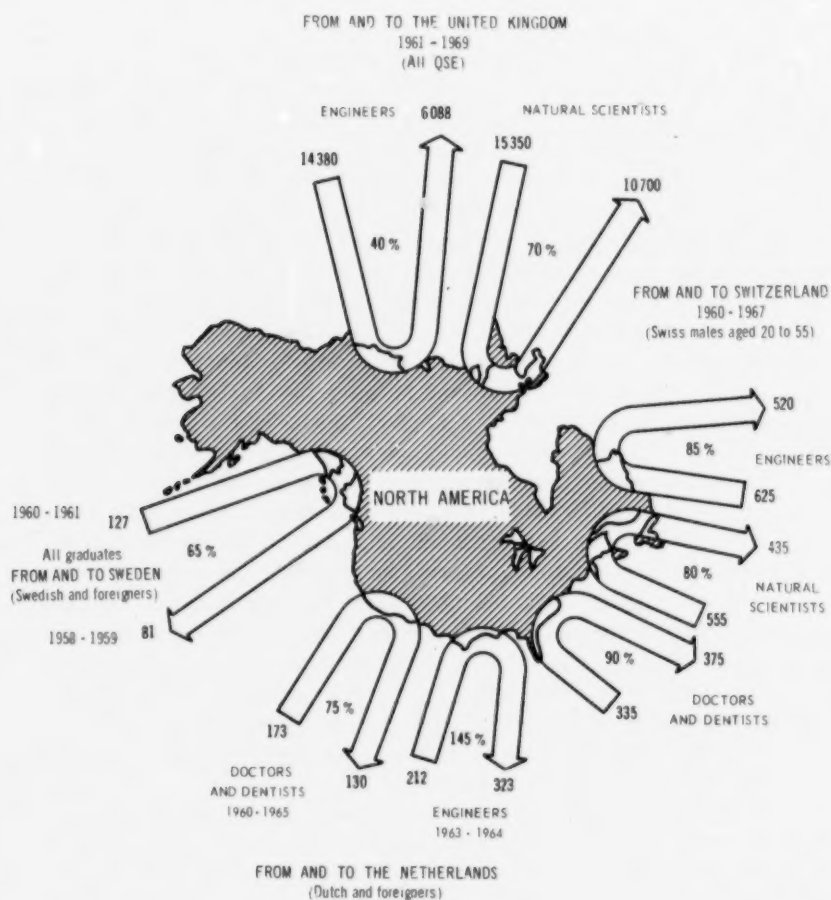
The number of foreign scientists and engineers may seem small compared with the massive U.S. stock but they were felt to have been both a quantitative and a qualitative loss to their countries of origin and this sentiment was exaggerated by the fact that whilst gross immigration of foreign scientists and engineers in the United States was heavily publicised few countries had much idea of how many of their nationals subsequently returned home. In fact subsequent surveys have revealed that significant numbers of scientists and engineers who went to North America from the Netherlands, Switzerland, Sweden and the United Kingdom did return to their country of origin. Unfortunately no such evidence is available for immigrants from developing countries.

In fact it seems that the OECD countries which cried out the loudest about the "Brain Drain", notably the United Kingdom, Sweden, Switzerland, have not suffered as much as they claimed and in fact had made a net gain on their respective circuits and that the countries who clearly made a loss out of it were very small satellite industrialised Member countries with an emigration tradition and the developing countries.

The first point is that the outcry was about quality not quantity. The "quality" question arose in two ways, first the publicity given to the emigration of well-established scientists and engineers to North America and secondly by the evidence that a large number of post-graduates, and particularly of Ph.D.s were also emigrating.

The clearest example of the first phenomenon occurred in Sweden where the whole question of "Brain Drain" was brought to the fore by the move to the United States of one scientist (who

Graph D
 FLOWS OF FOREIGN HIGH LEVEL SCIENTIFIC AND TECHNICAL PERSONNEL
 TO AND FROM NORTH AMERICA
 (SELECTED COUNTRIES, YEARS AND OCCUPATIONS)



subsequently returned) but the Press of other countries, notably the United Kingdom, contained numerous reports of eminent academics who were about to emigrate or who were threatening to emigrate if they did not get the grants they wanted. The great universities and foundations of the United States have long been richer than their European counterparts and have always generated a certain level of "pull". In addition to this, in the early 1960s they received a previously unequalled level of R and D support from the Federal government and for a short time this "pull" became even stronger. It is doubtful, however, whether enough key scientists have moved permanently to the United States to greatly injure the "excellence" of European science.

The second question of "quality" concern was the emigration of Ph.D.s and particularly their high and apparently increasing propensity to migrate straight from university(1). In the past Ph.D.s formed only a very small part of educational output and their employment prospects were restricted almost entirely to the University sector and to a few other research institutes. During the 1960s the universities in most Member countries underwent a period of growth which generated demand for more Ph.D.s to teach and to a lesser extent to do research. Similarly in many countries there was a trend away from government support for R and D in specified objectives (defence, nuclear energy) towards generalised support especially of basic research. The output of Ph.D.s began to grow rapidly but with a slight lag behind demand, especially in the United States. Ph.D.s have probably always had a particularly high level of "international" mobility to which was added a "pull" factor from the United States, and it is difficult to estimate how much "normal circulation" of Ph.D.s occurred and how much "net flow". It is not clear at what point supply of Ph.D.s generally overtook demand in Member countries but it seems clear that this point has now been reached in Canada, the United Kingdom and also the United States, and that in future there will probably be "downward" and "outward" mobility of Ph.D.s into

1) Migration from Developed Countries, the Case of Britain, prepared by Dr. James A. Wilson, Graduate School of Business, University of Pittsburgh, for the fifth meeting of the FAH/ACME, pp. 21, 26 and 27.

Motives and Qualifications of Scientists and Engineers Emigrating from Sweden, Committee on Research Economics, Stockholm.

Graduate Study and After, Stephen Hatch and Ernest Rudd.

the type of job which they would not previously have considered and which some are managing to avoid in the short term by taking post doctoral fellowships.

When we leave the question of quality and return to fields where quantity is more important, notably migration of engineers, the picture is a good deal less clear. At macro-level this springs from a general lack of statistical series which link stocks, utilisation and output probably because the gap between "occupied as" and "qualified as" is large for engineers and because engineers, unlike scientists and particularly unlike Ph.D.s, make a first move into industry at the beginning of their careers and make all subsequent moves, including migration, beyond easy reach of surveying statisticians and of science policy makers. The overall result is that only a few Member countries know exactly how many engineers they have and even fewer know what they are doing and how their situation is changing. The high level of movement to the United States was probably caused by the very rapid increase in demand, especially that for aerospace specialists, which created specific vacancies at all levels, combined with major cancellations affecting the aerospace industries in Canada and the United Kingdom.

At the moment of writing the "Brain Drain" seems to be a phenomenon of the past. The three main strands of demand mentioned in section B of Chapter I have, in general, lost their buoyancy. In several major Member countries government R and D support is flattening off and its pattern is changing significantly¹⁾. Education is no longer such a growth field and in the present economic situation industry is cutting back on recruitment. Educational output has grown and graduates and even Ph.D.s are experiencing extreme difficulty in finding jobs.

If and when scientific activity picks up again, the inherent potential imbalance between the pattern of supply and demand will again become obvious and migration of QSE will result. If, for instance, there is a massive re-orientation of government resources towards the "environment" in the United States and in other industrialised Member countries this might well provoke a new "Brain Drain" in the relevant fields of science.

1) Trends and Objectives, An Experimental Study of Government Resources devoted to R and D in Selected Member Countries, OECD.

Chapter II

MAIN RESULTS OF THE OECD STUDY

THE DATA AVAILABLE

The original aim of the study was to arrange a series of surveys in Member countries of the numbers and characteristics of foreign scientists and engineers in national stocks, which, taken together, would give an overall picture of both past and present migration of QSE. In fact, only four countries, Canada, Spain, Sweden and the United States, were able to provide detailed stock data as requested. The Secretariat therefore had to try and piece this together with various other sets of stock and new data available for Ireland, Netherlands, Norway, Switzerland and the U.K. and with the standard Canadian and U.S. immigration data. The resulting picture was rather incomplete but revealed the main factors involved. The major gap is generally the Germanic circuit and Germany itself in particular.

This chapter presents the main statistical results of the OECD survey under four headings: North America, United Kingdom, selected smaller industrialised Member countries, and Spain.

A. NORTH AMERICA

1. The United States - 2 decades of "pull"

Summary

The growth of the United States has been accompanied by, and indeed based on successive waves of immigration. The 1950s and 1960s saw a new period of expansion based on the growth of science and technology and of the activities and institutions connected with it. This expansion, which was particularly intense in the late 1950s and early 1960s, not only bred new overall demand for scientists and engineers which was generally in excess of

national supply but also set new standards of "excellence" in many fields. These factors, combined with the general high living standards in the United States, generated a powerful "pull" which attracted foreign scientists and engineers into the country.

Although the number of foreign scientists and engineers in the United States was only small compared with total national stock, immigrants probably played an important role in balancing supply and demand at the margin in the fields which were growing most rapidly, notably in research and especially in basic research.

The mid-sixties mark a high point in the expansion of science and technology in the United States. Since then there has been a levelling off in Federal support and a marked downturn in some areas, notably space and defence, finally resulting in unemployment of scientists and engineers at the close of the decade. Surprisingly enough, although there is evidence that it is the immigrants who have been particularly hard hit by unemployment, this appears to have been accompanied by rising immigration of scientists and engineers particularly from developing countries actually largely as a result of the changes in the immigration regulations. There has, however, been a decline in immigration from highly industrialised countries and there is some evidence of increased re-emigration to such countries.

The Growth in Demand

Between 1950 and 1966 the number of persons employed as scientists and engineers(1) rose by 150 per cent (as against 24 per cent for total employment). This growth in demand has four main components:

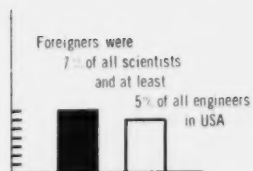
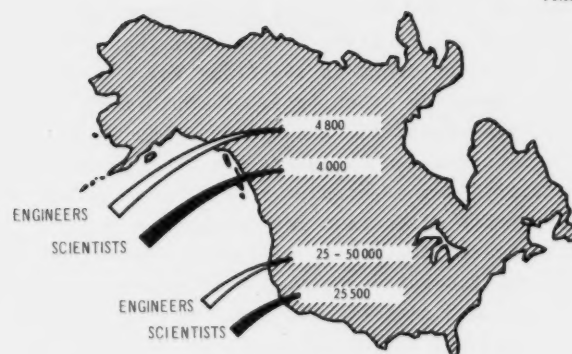
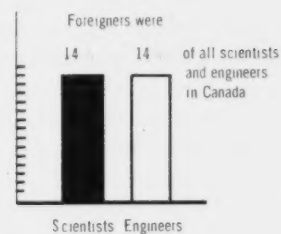
- i) Federal funds for R & D;
- ii) Federal support of other activities;
- iii) private funds for R & D;
- iv) private support of other activities.

In absolute terms the largest number of new jobs (55 per cent)(2) came from private support of other activities (mainly production and allied jobs for engineers in industry) followed by

1) Employment of Scientists and Engineers in the United States 1950-1966, NSF.

2) Percentages of net change in numbers of persons employed as scientists and engineers 1954-1966. Source: Federal Spending and Scientists and Engineers Employment, U.S. Department of Labor Bullt. 1663.

Graph E
 FOREIGN SCIENTISTS AND ENGINEERS IN NORTH AMERICA
 In Canada 1967
 In USA : Engineers 1964 - Scientists 1966



Sources : 6, 24 and 26, 29, 43.

federally supported R & D jobs (25 per cent) and then by privately supported R & D (10 per cent). During the 1960s the number of non R & D jobs supported by the Federal government remained approximately the same.

In relative terms the fastest growth rate occurred in R & D. The proportion of R & D personnel grew steadily from 28 per cent of all scientists and engineers in 1950 to 37 per cent in 1966.

The role of the different factors changed during the 1950s and 1960s. In the early 1950s the largest net increases occurred in privately financed non R & D activities, mainly in the business enterprise sector, and mainly concerned engineers. From the mid-fifties to the mid-sixties it was Federal R & D programmes which provided most of the new jobs particularly for scientists. However, Federal R & D funding reached a peak round about 1964 and has since flattened off or even declined at fixed prices mainly as a result of trends in Defence, Space and Nuclear funding(1). This has resulted in a net decline in federally supported employment which first declared itself in 1965(2). For a time this was outweighed by an increase in other types of employment but in 1970 the situation became critical and by 1971 there were significant numbers of scientists and engineers out of employment. In the case of scientists(3) the redundancy rates seem to be particularly high for young scientists previously employed on R & D in industry. Although approximately half of the unemployed previously received some Federal support, the role of the decline in space programmes does not seem to have been very important in causing redundancy amongst scientists.

Supply and the role of immigrants

The number of 1st degrees awarded in science and technology(4) fell during the early 1950s and in the period 1955-1957 was below the level of net increase in employment. From academic year 1954/55 onwards the numbers increased quite rapidly. However, this was

- 1) R & D in OECD Member Countries - Trends & Objectives.
- 2) Percentages of net change in numbers of persons employed as scientists and engineers 1954-1966. Source: Federal Spending and Scientist and Engineers Employment, U.S. Department of Labor Bullt. 1663.
- 3) Unemployment Rates for Scientists, Spring 1971, NSF, 1971.
- 4) Development of Higher Education 1950-1967, OECD, 1970.

Table a.1. United States

THE ROLE OF IMMIGRATION COMPARED WITH NUMBERS OF PERSONS
EMPLOYED AS SCIENTISTS AND ENGINEERS AND WITH EDUCATIONAL OUTPUT
IN PURE SCIENCE, AGRICULTURE AND TECHNOLOGY 1956-1966

	Numbers (thousands)			1956 emp = 100		
	Total	Engin.	Scient.	Total	Engin.	Scient.
Employed as 1956(1)	867.0	642.4	224.7	100.0	100.0	100.0
Employed as 1966(1)	1412.5	996.0	416.8	162.9	155.5	185.4
Net increase	545.5	353.6	192.1	62.9	55.5	85.4
Ed. output to lab. force(2)	742.2	358.6	383.6	85.6	55.8	170.7
Imm. of foreigners(3)	48.3	35.7	12.6	5.6	5.6	5.6
Imm. of nationals	..	..	..	..	..	..
Em. of foreigners	..	..	..	..	..	..
Em. of nationals(4)	2.2	1.8	0.4	0.3	0.3	0.2

- 1) Source: Employment of Scientists and Engineers in the United States 1950-1966, NSF 68:30; Excludes primary and secondary education.
- 2) OECD estimate based on Development of Higher Education 1950-1967, OECD, 1970.
- 3) Source: U.S. immigration data. Includes professors and instructors.
- 4) Source: Canadian immigration data - To Canada only. May include some non-Americans, excludes university teachers.

accompanied by an increased propensity to go on to postgraduate studies(1) and it is not clear how many of the potential new entrants actually went on to the labour market allowing for lags caused by further study and possibly also by military service.

It seems that the increased demand for engineers experienced in the early 1950s resulted in upward mobility (promotion of technicians) rather than immigration except possibly over the border. In the 1960 census nearly half of those employed as engineers did not have a college degree. In fact the role of immigrant engineers and particularly of those working outside R & D is not at all well documented. The gross immigration figures,

1) Trends in Graduate Education in Science and Engineering 1960-1970, NSF, 71.5.

Table a.2. United States

THE ROLE OF FOREIGN (BORN AND SECONDARY EDUCATED) QUALIFIED
SCIENTISTS AND ENGINEERS IN U.S. STOCK - 1964 AND 1966

			Engineers	Natural scientists
No. in thousands	1964	Minimum on Register(1)	20.0	12.3
		Estimated employed as(2)	47.2	22.5
	1966	Minimum on Register(1)	21.3	14.7
		Estimated employed as(2)	50.0	25.5
% of national stock	1964	Minimum on Register(1)	4.9	7.4
		Estimated employed as(2)	5.0	6.9
	1966	Minimum on Register(1)	4.9	7.9
		Estimated employed as(2)	5.0	7.2
Area of origin		OECD	59.8(3)	55.3(4)
		E. Europe		10.0
		Developing	40.2	32.7
		Other(5)		2.0

1) Respondents to survey of Members of professional societies.

2) Grossing up an OECD estimate.

3) 1964.

4) 1966.

5) Including Australia.

Source: The International Movement of Scientists and Engineers,
OECD, 1970.

which are based on the immigrants' statement of an occupation, probably over-estimated the numbers concerned particularly as no re-emigration data is available for the major countries of origin. The only data for stocks of foreign engineers in the United States is taken from a sample study of one in ten members of engineering societies made in 1964, 6.5 per cent of whom were foreign born(1). These foreign born engineers were spread throughout the sample but were particularly well represented in research and in teaching activities and amongst those employed in universities and engineering schools. In general they were older and slightly more

1) Trends in Graduate Education in Science and Engineering 1960-1970, NSF, 71.5.

highly qualified than the indigenous Americans. Compared with foreign scientists they were more likely to come from the OECD area, and particularly from Canada or Germany/Austria and as might be expected far more were employed in industry. Although they showed some bias compared with Americans towards the Ph.D./university/teaching axis their contribution in industrial employment was average (6.5 per cent) and to management and production activities only slightly under par (5.6 per cent).

The federally funded demand for R & D scientists and engineers experienced in the later 1950s and early 1960s could only rarely be met by upward mobility. Much of the demand was for very highly qualified manpower for basic research. Whilst supply of doctorates was increasing there was also an increase in demand for Ph.D.s for teaching the new waves of post-graduate students and manpower studies of the period expressed concern at shortages of Ph.D.s in the present and in the future.

Here foreign scientists and engineers played an important part in balancing supply and demand at the margin. The bias of foreign engineers towards R & D has been noted. Surveys of foreign scientists in the United States made in 1964 and 1966 showed that they were even more heavily concentrated along the basic research teaching/university/Ph.D. axis than were either the foreign engineers or American scientists. Some of these foreign scientists had obviously been in the United States for many years and had come as the result of political or other "push" factors in the past. Most of them, however, were in their 30s or early 40s and these were also amongst the age groups in which they contributed most to U.S. stock. These younger scientists could roughly speaking be divided into two classes. The first group came from highly industrialised countries and were mostly highly qualified on entering the United States, often already holding a Ph.D. In general they earned approximately the same as indigenous Americans when employed in the academic sector. The second group (which was much larger among scientists than among engineers) came mainly from developing countries and had been "retained" in the United States after completing their higher education. In general they were even more concentrated in the higher education sector but earned rather less than Americans. Both types of foreigners earned less than Americans when employed in industry or business.

Table b.
THE CHARACTERISTICS OF FOREIGN SCIENTISTS AND ENGINEERS IN THE UNITED STATES

	Foreign engineers(1) 1964		All foreign scientists(2) 1966		Foreign Ph.D. scientists base(3)	
	% of total foreign engineers	% of U.S. national stock	% of total foreign scientists	% of U.S. national stock	% of all foreign Ph.D.s	% of U.S. national stock
Total Foreign	100.0		100.0	7.5	100.0	11.5
Level of Qualifi- cation						
Ph.D.	13.2	17.1	57.1	11.5	100.0	11.5
Prof. Med.	0.1		5.4	15.4		
Masters	22.8	8.6	21.1	5.8		
Bachelors & Ass.	40.7	4.0	10.7	3.7		
Less	8.5	13.9	0.4	3.2		
Foreign & no reply	14.7	94.7(3)	5.2	31.0(3)		
Activity						
Bas. research	10.2	11.3	32.6	15.6	39.8	18.0
Applied research			12.5	7.4	12.4	11.4
Development	25.0	7.8	3.5	5.6	1.8	14.0
R & D management	8.6	5.6	8.1	6.1	9.2	8.5
Other management	9.2	5.6	3.6	2.6	2.6	4.5
Production & Insper.	11.5	5.6	2.8	2.8	0.8	10.0
Teaching	11.2	3.4(3)	17.5	7.1	25.0	9.5
Consulting	18.3	3.7(3)	19.9	5.1(3)	9.4	15.3
Other & no reply	18.9				9.0	15.6(3)
Sector						
Higher education	9.5	11.1	45.7	10.7	55.0	11.6
Other education			1.5	1.2	0.1	0.6
Government	10.3	4.6	1.3	3.4	7.9	13.7
Industry & Business	66.4	55.5	29.8	6.3	2.3	13.1
Self-employed	4.9	5.5	1.3	4.6	1.0	1.1
Not employed	1.5	6.1	6.0	11.0	6.1	1.1
& no reply	7.4	5.6(3)	8.4	6.7	0.4	11.3
Age						
25-29	1.1	4.2	1.4	4.0	0.1	9.6
30-34	1.7		1.2	3.2	0.1	10.6
35-39	12.4	6.2	19.7	9.2	3.2	16.6
40-44	17.0	6.2	20.4	9.1	22.7	18.0
45-49	17.7	6.2	16.2	8.1	18.0	11.9
50-54	10.9		10.2	6.6	11.1	9.5
55-59	11.0	7.6	6.4	7.0	7.0	8.8
60-64	7.7		4.9	7.3	5.4	10.3
65-69	7.6	10.8	2.9	9.4	4.4	12.2
70 & no reply	2.3		2.4	13.5	2.5	13.0
	2.6		1.3	0.4(3)	1.7	10.5(3)

1) Sample of foreign born - Members of engineering societies.
2) Foreign born and secondary educated members of scientific societies including selected social scientists.
3) Excluding "no reply".
Source: Material from the National Registers prepared specially for OECD and for H. Grubel by NSF.

We thus have evidence of two of the indices of a "pull" situation for scientists: high "retention" of new foreign graduates and net immigration. (The proportion of foreigners in national stock of scientists rose from 7 per cent in 1964 to 8 per cent in 1966.) The other indication mentioned was low mobility of nationals. In the 1966 registration on Members of U.S. scientific societies only 1.5 per cent reported an address abroad of which about one-third were still employed by the Federal Government or were on military service. Similarly only 0.3 per cent of the indigenous Americans in the survey had obtained their highest qualification abroad.

It appears that foreign scientists have suffered particularly from the turndown in employment. In spring 1971 non-citizen scientists reported a 4.2 per cent unemployment rate compared with 2.5 per cent for U.S. citizens. Whilst there is some evidence of repatriation of scientists to highly industrialised countries, notably of Swiss and Germans, it is not clear what was to become of the "retained" foreign graduates, most of whom cannot hope for similar jobs in their home countries.

If this is true why is it that immigration of scientists and engineers continued to grow in the late 1960s and reached a new peak in 1970? This apparent increase resulted from changes in the immigration regulations which favoured entry from the Eastern hemisphere and was in fact only partly real new entry as many of those registered as immigrants had already been in the United States for a number of years and were able to "adjust their status" as a result of the change in the Act. By 1970, however, the role of adjustment was declining. Most of the "real" increase in immigration was from Asian developing countries suggesting either that "push" factors were at work, that the unemployment message had taken longer to reach them or that this was part of a greater general inflow of all types of immigrants.

2. Canada

Summary

Canada has depended on immigrants even more than has the United States for increase in the number of HQM. Although the percentage of scientists and engineers in total immigration is now similar in the two countries(1), immigrant scientists and

1) See also Appendix Table 1.

engineers are relatively much more important in Canada compared both with educational output and with total national stock.

It is difficult to examine the role of immigrants in balancing supply and demand in Canada, for two reasons. Firstly, there is a basic lack of data, not as much for immigration but on changes in stocks of QSE and in patterns of utilisation. Secondly, Canadians themselves are very mobile and it is not realistic to assess the situation in Canada in isolation from that of the United States. Taking the extreme view Canada is a geographical area which employs about 10 per cent of the "North American" stock of QSE, supplies 5-10 per cent of new supply and receives 30-40 per cent of all incoming foreign QSE. Even allowing for some national barriers between the two countries it is clear that a high degree of mobility over the border can be expected and that Canada will be the first to be affected by any disequilibrium between QSE supply and demand in the United States.

In fact during the 1950s the predominant factor was the "pull" situation in the United States. Demand for QSE in Canada itself was not always effective and there were heavy net flows over the border to the United States which in some years almost exceeded immigration of scientists and engineers from outside North America. During the 1960s there was a rapid growth in demand for scientists and engineers in Canada notably in industry and in the universities and this generated a countervailing "pull". Thus, by the middle and late 1960s not only were large numbers of scientists and engineers entering Canada from outside North America but the net flow over the border decreased and even became favourable in some occupations. By 1970, however, this growth in demand was played out. The redundancies in the United States and the effects of the change in U.S. immigration regulations reduced outflow over the border whilst (as in the case of the United States) immigration continued at a high level. All these factors have resulted in a critical employment situation for scientists and engineers which is expected to continue.

Demand

It is very difficult to get a clear picture of what happened to demand for scientists and engineers in Canada particularly in the 1950s. This is partly because of lack of information but also because the role of indigenous Canadian demand in the supply/demand equation far from being decisive as in the United States,

is moderated by a number of other factors of which the most important is certainly demand in the United States, but another is demand in Europe, especially in the United Kingdom, which is a major source of immigrants.

It might be suggested that the situation in Canada as far as effective demand (i.e. financially attractive) is concerned falls into four periods. The first lasts for most of the 1950s, culminating in 1957 when the Canadian economy was expanding and there was effective new demand especially for engineers. In the late 50s and early 60s there was a dip in demand because of slackening in the economy and of major cancellations in military aerospace programmes. However, for the early 1960s onwards demand picked up considerably⁽¹⁾. One of the two main factors concerned was the expansion of post-graduate education and university R & D which created a demand for very high level teachers and researchers. This demand was made effective by the decision to increase Canadian university pay to levels competitive with the United States, and during the 1960s science and engineering facilities grew at an average of 13 per cent p.a. The second factor was an increase in industrial R & D. The annual rate at which new laboratories were established rose from 19 in 1955 to a peak of 63 in 1965. By 1968 these growth factors were played out. In 1969 there was no net increase in the number of R & D laboratories in industry and the number fell in 1970. Similarly the rate of growth of university faculties fell to 5 per cent or less in 1970. No significant upturn in demand is forecast.

Supply and the role of migration

The annual output of pure scientists remained stable at about 6-700 per annum during the early 1950s, from the mid-50s it picked up, passing 1,000 in 1958/59 and almost quadrupling between then and 1966/67. The increase in technology first degrees has been less marked. Starting at about 1,250 p.a. in the early 1950s the number almost doubled by 1961/62 but then levelled off. There has, however, in latter years been considerable growth in non-university technological higher education. There has been a rapid increase in the number of doctorates awarded in science and technology, from about 200 p.a. in the mid-50s to more than 1,000 p.a. at the close of the 1960s.

1) Prospects for Scientists and Engineers in Canada, F. Kelly, Background Study for the Science Council of Canada, Special study no. 20.

Table c.1. Canada

ROLE OF MIGRATION IN ESTIMATED GROWTH OF NUMBER OF SCIENTISTS (S)
AND ENGINEERS (E) IN THE LABOUR FORCE - 1963-1973

	Numbers (thousands)		Percentages	
S + E in labour force 1963	89.8		100.0	
+ total university output		+104.9		116.8
less drop-out		- 10.5		11.7
less foreign graduates		- 5.2		5.8
Plus upgrading +		21.0		23.4
Net increase +	110.2		122.7	
-	19.9		22.2	
Net national change	90.3		100.5	
Total immigration	38.0(1)		42.2(1)	
Foreigners		38.0		42.2
Nationals		..		..
Total emigration	12.4(2)		13.8	
Foreign born		7.9(3)		8.8
Canadian born		4.5		5.0
Net migration	+ 25.6		28.5	
Foreign		+ 30.0		33.4
Canadian born		- 4.5		- 5.0
Total net increase	115.9		129.0	
Est. S + E in labour force 1973	205.7		229.0	

- 1) Foreign landed immigrants only.
 2) To United States only - excluding U.S. citizens.
 3) Excluding U.S. citizens - including perhaps 33% secondary educated in Canada.
 Source: Projections of R & D Manpower & Expenditure, Jackson, Henderson and Leung for the Science Council of Canada.

When examining the role of migration in balancing supply and demand for QSE in Canada two sets of flows have to be taken into consideration. The first is movements in and out of Canada from outside North America and the second is movements across the border to and from the United States. The first may be taken as an indication of the situation in Canada though it will also be affected by "push" or "pull" situations in the countries of origin. In the case of flow over the border the extreme geographical proximity of most Canadian population centres to the United States, the similarity of language and background and the

Table c.2. Canada

ROLE OF FOREIGN (BORN AND SECONDARY EDUCATED) QUALIFIED
SCIENTISTS AND ENGINEERS IN CANADIAN STOCK - 1967

	Total		Engineers		Nat. scientists	
	E	Q	E	Q	E	Q
in thousands	7.4	7.9	4.8	4.9	2.6	3.0
% of national stock	14.7	13.6	14.3	13.1	15.6	14.3
Area of origin %		100.0		100.0		100.0
OECD		70		70		71
East. Europ.		1		1		1
Developing		24		24		23
Other(1)		5		5		6

E = Employed as; Q = qualified as.

1) Including Australia.

Source: Tables for OECD Study of Foreign Born Manpower.
Department of Manpower and Immigration.

ease of north/south compared with east/west travel would lead us to expect a very high degree of "normal mobility". Given the preponderant weight of the United States in all North American demand for QSE, abnormal net flows either way will be only partially a function of the situation in Canada.

The data available is only partial, lacking any information on repatriation. Given its limitations it reveals four broad periods:

- i) 1950-1957, high immigration of scientists and engineers into Canada from outside North America but with rising emigration over the border to the United States;
- ii) 1958-1962, declining immigration and high flow over the border;
- iii) 1963-1969, decreased outflow over the border and increased inflow from both outside and from the United States;
- iv) 1970, decreased flows of all kinds.

The acutest outflow situation occurs round about 1960 when more engineers left Canada over the border than entered from outside North America. The highest inflow occurred in 1969 when there was actually a net inflow over the border in several natural science occupations and a very high net inflow of university teachers.

The actual role of foreign scientists and engineers in balancing supply and demand is not very well documented though their quantitative impact is obviously very large. Throughout the 1950s and early 1960s gross immigration of scientists was equal to about 20 per cent of educational output and the number of engineers entering Canada actually exceeded the number of new graduates in some years.

However, a survey undertaken in the late 1950s showed that 15 per cent of jobs for scientists and engineers and architects went to recent immigrants as against 42 per cent to new university graduates and 43 per cent to experienced Canadians. Similar results were found in a survey of all scientists and engineers in Canada in 1967 which revealed that 14 per cent had been born and secondary educated abroad. The foreign scientists were more highly qualified than total Canadian stock. Chemists and atmospheric, lithospheric and hydrospheric specialists were the largest groups. Foreigners made their highest contribution to national stock in physics (23 per cent) and biology (21 per cent). Construction engineers were the largest group of foreign engineers followed by petroleum and mining experts.

B. OTHER LARGE INDUSTRIALISED COUNTRIES

1. The United Kingdom

Summary

During the 1960s writers in the United Kingdom were particularly concerned about international movements of scientists and engineers, or the "Brain Drain", as the newspapers described it. The main burden of their song was that in a period when British universities were suffering from the results of a trend away from science, and particularly a trend away from technology in the secondary schools and when industry was crying out for qualified manpower, the flower of Britain's youth was emigrating. Various analyses were made of the situation and efforts were made to try and retrieve those who had gone abroad, especially to the United States.

A recently published study⁽¹⁾ made by the United Kingdom Department of Trade and Industry which presents an integrated

1) Persons with Qualifications in Engineering, Technology and Science 1959-1968, Department of Trade and Industry, Studies on Technological Manpower, No. 3.

model of changes in stocks and utilisation of QSE in the United Kingdom between 1959 and 1969 (including gross and net migration results), suggests rather a different picture. Firstly, it shows that overall the United Kingdom made only a very slight net loss from migration in the 1960s (2 per cent of 1959 stock) and that this loss was almost exclusively of British (and Commonwealth) engineers for whom industry was supposed to be crying out whilst, except in the last years of the survey, there was a net flow into Great Britain of British (and Commonwealth) natural scientists. Throughout the period there was a net inflow of foreign born scientists and foreign born engineers who in 1966 were 9 per cent of all engineers and 8 per cent of all scientists in the United Kingdom. Furthermore the study shows significant evidence of downward mobility of QSE in the late 1960s which suggests that, even allowing for migration, the United Kingdom was tending towards oversupply.

Since 1968, the year in which the DTI study ended, there has been a further turn-down in demand in the United Kingdom resulting in many new graduates being unable to find work. In addition many scientists and engineers in North America have been applying to the retrieval service but have been unable to find places.

Trends in Demand

Between 1959 and 1968 the number of persons with science, engineering and technology qualifications employed in the United Kingdom rose by 53.8 per cent(1).

During this period the main threads of demand were demand from industry for production and other activities, demand from industry for privately funded R & D, demand based on government R & D programmes and demand based on educational programmes. Of these the largest, but the least well documented, is demand from industry for non R & D purposes. It is particularly hard to distinguish here between the quantity and type of graduates which industrialists really wanted to hire at the going rate, the quantity they said they needed (vacancies and projected demand) and what science policy makers felt was best for British industry. Assuming that actual employment did not fall very short of effective demand, general industrial demand was not a growth area though there were some bright spots, notably the electronics industry.

1) Persons with Qualifications in Engineering, Technology and Science, op.cit.

Nor was R & D particularly buoyant in the 1960s. The growth period for research in the United Kingdom was mainly in the 1950s and after 1961/2 expenditures grew only at the same, rather low rate as GNP. Within the total there were changes in emphasis, with the role of private funding increasing and that of government funding decreasing mainly as a result of declining support for defence and nuclear programmes. Whilst it is not possible to assess the effects of these trends on the employment of QSE with any accuracy it might be suggested that in general there was little real increase in demand for professional R & D scientists and engineers in the business enterprise sector in the later 1960s, as the decline in government R & D contracts and the increase in private funding were more or less in balance. There was a decline in demand within the government sector for nuclear specialists but a significant increase in the number of QSE supported by the Research Councils.

"Education" was probably the most rapidly increasing sector of demand. The early 60s saw a rapid expansion in the number of universities in the United Kingdom and this, combined with the increased amount of post-graduate study, created many new posts, especially for very highly qualified scientists. In the late 1960s this expansion slowed down but was to a certain extent replaced by demand from the growing technical college sector for more technologists and engineers. Throughout the 1960s there was also a high level of demand for QSE for teaching posts in secondary education.

Effective demand for scientists and engineers appears to have been less buoyant in the United Kingdom in the 1960s than in Canada and the United States and was at a particularly low pitch by 1970 with private R & D funding and general economic activity flattening off and Research Council funding restricted. University Appointments Boards have reported large cuts in recruiting by industry and by other sectors.

New supply

New supply of scientists and engineers⁽¹⁾ rose from 14.5 thousand in 1959 to 27.4 in 1968. The total new supply over the decade was 201.3 thousand of which 140.0 thousand had a university degree and the remaining 61.3, mainly engineers, had obtained

1) Persons with Qualifications in Engineering, Technology and Science, 1959-1968, Department of Trade and Industry, Studies on Technological Manpower No.3.

membership of a professional society. Slightly over half the new supply (103.4 thousand) were engineers and technologists, slightly under half were natural scientists. New supply grew every year during the period with particularly large increases in 1960, 1964 and 1968. In general output of scientists grew more rapidly than that of engineers and technologists, more than doubling during the decade. Output of graduate engineers also doubled but the number entering supply via membership of societies remained more or less stable.

Output of high level (Masters and doctorate) degrees in pure sciences rose from about 900 p.a. 1950/51 to about 3,500 p.a. in 1966 of which about two-thirds were doctorates(1). Over the same period award of higher degrees in technology rose from about 300 to nearly 3,000 p.a. of which about one-third were doctorates.

Utilisation and the role of migration

Gross mobility of QSE in and out of the United Kingdom was quite high. Between 1959 and 1968 the inward and outward flows were equivalent to over one-quarter of national stock in 1959.

In net terms, however, the United Kingdom lost the equivalent of 2.3 per cent of 1959 stock of QSE to abroad in the decade. This outflow was in fact the balance of a net outflow of 8.5 per cent of 1959 stock of engineers and a net inflow of 4.5 per cent of 1959 stock of scientists. Migrants are divided by origin into two classes only, usually "British and Commonwealth" and "Irish and other foreign". There was a significant net outflow of "British and Commonwealth" engineers which more than outweighed the "Irish and other foreign" inflow, giving an overall net outflow. There was, however, a modest net inflow of "British and Commonwealth" scientists to add to the net inflow of "Irish and other foreign" scientists. It seems that the outflow of "British and Commonwealth" engineers was predominantly British and the inflow of "Irish and other foreign" engineers was predominantly other foreign. About 40 per cent, however, of the net inflow of "British and Commonwealth" scientists came from Commonwealth countries and about 15 per cent of incoming "Irish and other foreign" were Irish (1961-1966 only).

There were net inflows of "Irish and other foreign" scientists and engineers every year between 1959 and 1968. There were net

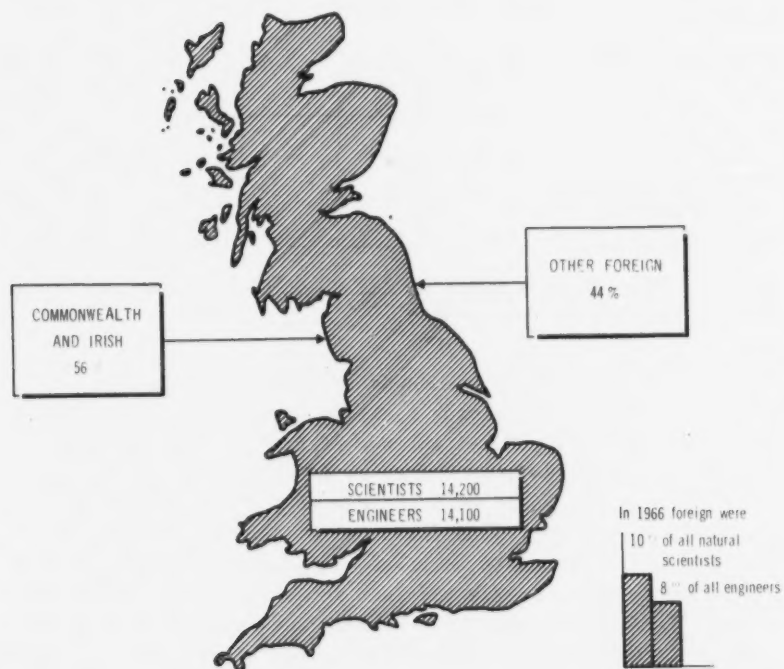
1) Development of Higher Education 1950-1967, OECD, 1970.

Table d.1.

UNITED KINGDOM - THE ROLE OF MIGRATION IN CHANGES IN TOTAL
STOCK OF QUALIFIED SCIENTISTS AND ENGINEERS - 1959-1969

	Numbers (thousands)			1959 stock = 100.0		
	Total	Engineers and tech- nologists	Natural scien- tists	Total	Engineers and tech- nologists	Natural scien- tists
Stock 1959	255.3	133.2	122.2	100.0	100.0	100.0
New qualifi- cations +	201.4	103.5	97.9	78.9	+77.7	+80.1
Deaths -	25.7	14.3	11.4	10.1	-10.7	-9.3
Natural increase	+175.6	+89.2	+86.4	+68.8	+67.0	70.7
Immigration total	+69.4	+26.2	+43.2	+27.2	+19.7	+35.4
British and Common- wealth	+53.0	19.7	33.4	+20.8	14.8	27.3
Irish and other foreign	16.4	6.5	9.9	+6.4	4.9	8.1
Emigration total -	75.2	37.5	37.7	29.5	28.2	30.9
British and Common- wealth	68.0	35.7	-32.3	26.6	26.8	26.4
Irish and other foreign	7.2	1.8	5.4	2.8	1.4	4.5
Net migration total	-5.8	-11.3	+5.5	-2.3	-8.5	+4.5
British and Common- wealth	-15.0	-15.9	+1.1	-5.9	-11.9	+0.9
Irish and other foreign	+9.2	+4.6	+4.4	+3.6	+3.4	+3.6
Total net change +	+769.8	+77.9	+91.8	+66.5	+58.5	+75.2
Stock 1969	425.1	211.1	214.0	166.5	158.5	175.2

Graph F
FOREIGN BORN QUALIFIED SCIENTISTS AND ENGINEERS
EMPLOYED - GREAT BRITAIN - 1966



Source : 45

Table d.2

UNITED KINGDOM - THE ROLE OF FOREIGN (BORN) IN
EMPLOYMENT OF QSE IN 1961 AND 1966

	Total		Engineers & Technologists		Natural Scientists	
	1961	1966	1961	1966	1961	1966
Thousand - total	22.8	28.3	11.4	14.1	11.4	14.2
Commonwealth and Irish Republic	15.0	16.0	7.1	7.3	7.9	8.8
Other foreign	7.8	12.3	4.3	6.8	3.4	5.4
% of national stock - total	9.2	9.1	8.4	8.4	10.3	9.9
Commonwealth and Irish Republic	6.1	5.2	5.2	4.3	7.2	6.1
Other foreign	3.1	3.9	3.2	4.0	3.1	3.8

Source: Persons with Qualifications in Engineering, Technology and Science 1959-1968, op.cit.

outflows of British and Commonwealth engineers in all years except 1961 and 1962 (giving a slight overall net inflow of engineers in 1961) but net inflows of British and Commonwealth scientists until the last two years (1967 and 1968)(1).

Although there were net inflows of foreign scientists and engineers during the 1960s the share of foreign born in total employment of scientists declined very slightly from 10.3 per cent at the 1961 census to 9.9 per cent in 1966. The percentage of foreign born(2) in employed engineers was 8.4 per cent at both censuses. The "other foreign born" share of national stock increased between 1961 and 1966 but the "Irish and Commonwealth" share dropped.

- 1) It should be noted that the model assumes a more or less steady percentage of foreigners in each of the four flows (incoming scientists, outgoing scientists, incoming engineers, outgoing engineers) and therefore does not allow for any radically different trends in movements of nationals and foreigners.
- 2) It is not clear how many of the foreign born were "foreign" by OECD standards i.e. completed their secondary education before entering the country and if any of them had been "retained" on completing their higher education. The model assumes that both these classes are negligible and that all net change in employment of foreign born QSE is the result of net immigration of foreign QSE.

Material has been received giving some details on migration to and from North America. There were net outflows of both scientists and of engineers and technologists to North America throughout the period 1961-1969. In both cases outflow to North America grew steadily from 1961 to 1967 and then declined. The rise in emigration of engineers was particularly rapid from about 600 in 1961 to 2,700 in 1967. Inflow from North America showed no particular trend except for rather higher figures in 1968 and 1969.

It is not possible to follow through these new migration data in the model to micro-level to see in which industries and fields the immigrants were concentrated or to find out more about their origins. It is possible from other sources to find out a little more about the emigrant scientists. It appears that many of them migrated straight from university, often on completing higher degrees. Very little has been published about the emigrating British engineers, most of whom left the United Kingdom after a period of employment.

The evidence would seem to point to an overall "pull" situation for natural scientists during the early 1960s turning to "push" and net outflow in 1967 and 1968. The situation for engineers is less easily explained. Engineers had a slightly lower propensity to emigrate than scientists but a much lower repatriation rate which suggests "pull" elsewhere rather than United Kingdom "push". In any case it seems that by the late 1960s the United Kingdom was not experiencing any shortage of scientists and engineers. The clearest indication is that between 1965 and 1968 not only did employment of scientists and engineers grow more slowly than between 1962 and 1965 but practically all the increase was in the numbers of graduates employed as technicians, i.e. "downward mobility".

C. SELECTED SMALLER INDUSTRIALISED MEMBER COUNTRIES

Summary

During the 1960s discussion of the "Brain Drain" centred on flows between larger Member countries and especially between the United Kingdom, Canada and the United States. Little attention was given to the situation of smaller Member countries.

It appears that QSE in these countries were internationally very mobile and that some of them, notably Sweden and Switzerland, have exercised quite heavy "pull" on their neighbours and have a

significant percentage of foreigners in national stock whilst others such as Ireland and to a lesser extent Norway have an emigration tradition, particularly to their more technologically advanced neighbours.

It also appears that even in the late 50s and early 60s, the maximum "pull" years in the United States, there was quite a high repatriation rate of scientists and engineers from North America to the Netherlands, Sweden and Switzerland and that, all in all, these countries probably gained more than they lost from international movements of scientists and engineers in the 1960s.

1. The Netherlands, Sweden and Switzerland

Demand

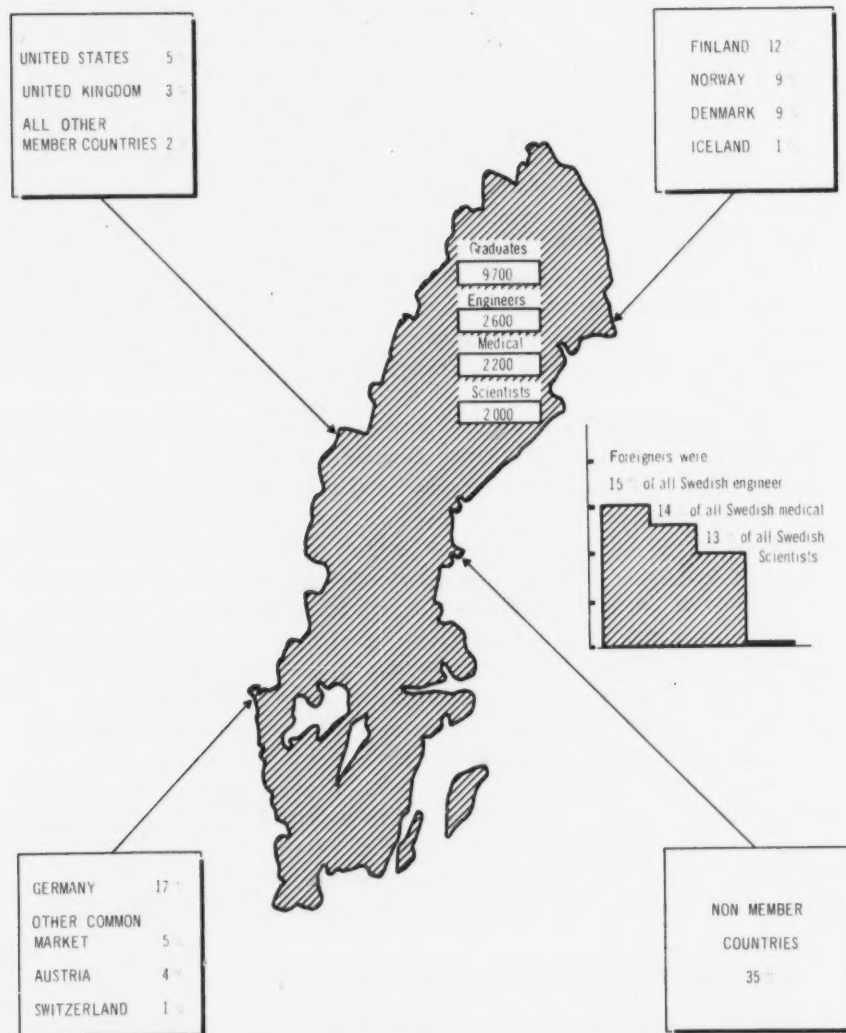
All three are very highly industrialised and with heavy investment in science-based industries, such as chemicals and petroleum products in the Netherlands, drugs in Switzerland and transport equipment in Sweden, and it can be assumed that there would have been a high level of general demand from industry during the 1950s and 1960s for graduates in the relevant discipline. Demand generated by government funds is not well documented in Switzerland but it appears that after a period of relative stagnation, efforts to organise R & D at national level and improve the university milieu began in the late 1960s. The Netherlands government is relatively speaking one of the heaviest spenders on R & D in the OECD area (especially if military projects are excluded). Swedish government R & D funding is also fairly high.

Utilisation and the role of migration

It is not possible to produce integrated macro-tables showing the role of migration compared with changes in total stock both because the migration data is patchy and because stock data is available for only one point in time.

It appears, however, that in the early 1960s all three countries were experiencing net immigration of foreign engineers which more than outweighed net emigration of nationals. The situation for scientists is less well documented. Both Sweden and Switzerland experienced net inflow of nationals. Switzerland probably made a net gain allowing for foreign scientists but the overall outcome for Sweden is less clear.

Graph G
FOREIGN GRADUATES IN SWEDEN 1960



Sources : 11, 12

In the case of Sweden an overall net flow of all types of graduates to North America and to "other" was just outweighed by an inflow from Europe. Similarly Switzerland experienced a net loss of Swiss scientists and engineers to North America with slight gains of engineers from Europe and elsewhere but losses of scientists. There were net outflows of Dutch engineers(1) to almost all areas but this was more than outweighed by incoming foreigners including from North America. Although there was net outflow from all three countries to North America this was significantly lower than gross outflow, showing clearly that for these countries at least the United States immigration data over-estimate net inflow. The repatriation rate for the Swiss has increased since the original OECD study was completed.

Perhaps the most interesting fact about Dutch emigrant engineers was that over one-quarter of those employed abroad were still employed by Dutch companies which may help to explain both the high mobility and the high repatriation rates of their nationals.

For both Sweden and Switzerland estimates are available of the number of foreign HQM in the country taken for the 1960 census. In Sweden(2), in that year, approximately 15 per cent of all engineers in Sweden were foreigners as were 13 per cent of all scientists. As in Canada and the United States the migrants were more highly qualified than home QSE. Nearly half of these foreign graduates had been in Sweden since before 1947; many of them were refugees from the Baltic countries. About one-third of the immigrant graduates came from other Nordic countries. Mobility was quite high. Thus by 1967 one-quarter of all the immigrant graduates who had entered Sweden since 1947 had re-emigrated and of these 15 per cent had subsequently re-entered Sweden.

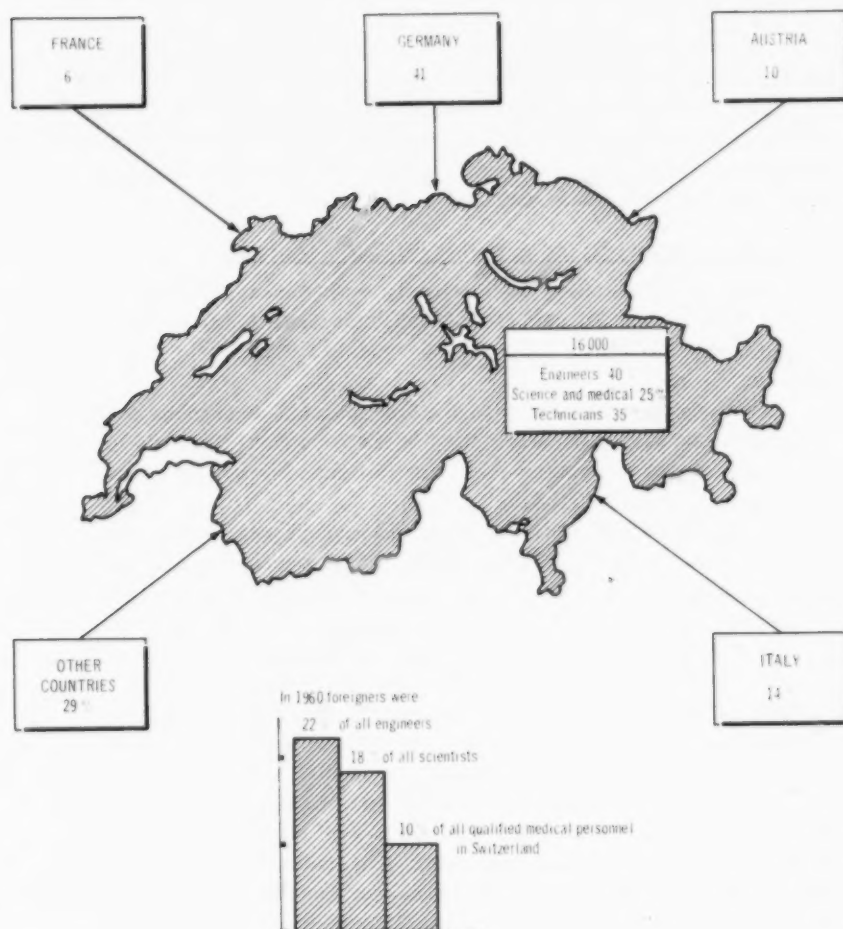
In 1960 approximately 22 per cent of all engineers in Switzerland(3) were foreign as were 18 per cent of all scientists. Nearly three-quarters of foreign HQM in Switzerland came from adjoining countries, over half from Germany and Austria. As in the case of Sweden they were relatively most highly represented

1) Report of the Study Group "Emigratie Geleerden", Royal Netherlands Academy for Science.

2) Number of Persons with Higher Education in Sweden who Immigrated from Abroad, Friborg, Swedish Research Council.

3) Brain Drain oder Brain Gain, R. Guiccardi, Basle University.

Graph H
FOREIGN SCIENTISTS, ENGINEERS, MEDICAL PERSONNEL AND TECHNICIANS
IN SWITZERLAND IN 1967



amongst physical than life scientists. It is estimated that the absolute number of foreign HQM in Switzerland continued to rise up to and including 1965 but has since turned down slightly.

2. Ireland and Norway

Demand

Ireland and Norway are not only significantly smaller than the Netherlands, Sweden and Switzerland, but they are as yet far less dependent on the science-based industries and the general demand from industry for science graduates is relatively restricted. Similarly they are only moderate R & D spenders both in absolute terms and compared with national resources.

Supply, utilisation and the role of migration

Both countries have a relatively well developed higher education system and, in addition, both, but especially Norway, have a tradition of sending engineering students abroad for first degrees.

Both are situated next to a more "science and technology oriented" country with which they share a common language and which the formal migration barriers are minimal but also have a tradition of wider migration.

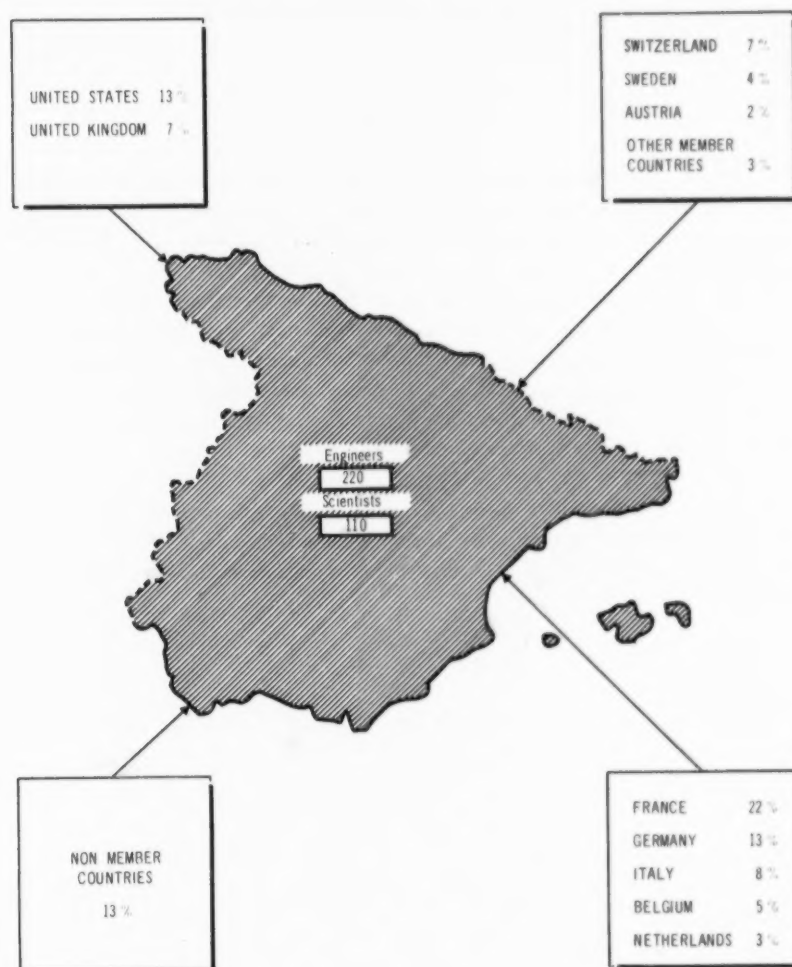
Thus, 75-80 per cent of Irish scientists and engineering students thought they would go abroad at some time during their career and not less than 60 per cent of engineers and 50 per cent of natural scientists intended to emigrate on graduation(1).

In 1965 there were no less than 2,400 Norwegian engineers abroad (less than doctorate level) representing over 20 per cent of national stock (this probably contains a large element of "natural mobility"). There were significantly fewer natural scientists abroad both absolutely (about 150) and as a percentage of national stock (4 per cent). The emigration rates were particularly high for engineers who had taken their first degree abroad. Most of the emigrants with doctorates had gone to North America as had about half the engineers. Sweden was the second largest destination(2).

1) The Irish Brain Drain, R. Lynn, Irish Institute for Social and Economic Research, 1968.

2) The Problems of a Small Scientific Community. The Norwegian Case, H. Skole, Minerva VII 3.

Graph I
FOREIGN SCIENTISTS AND ENGINEERS IN SPAIN
IN 1966



We have little information about foreign scientists and engineers in either Ireland or Norway but it can be assumed that the numbers will be negligible compared with national emigration. Ireland and Norway, have therefore, made a "net loss" out of migration of QSE, though whether the outgoing scientists and engineers could have been more profitably employed at home is another question.

D. SPAIN

Spain is a "developing" OECD country and although industrialisation is going ahead quite rapidly there is still little overall demand for scientists and engineers outside the higher education sector. A special survey in 1966(1) revealed 300-500 foreign scientists and engineers in Spain of which two-thirds were engineers and one-third scientists, mainly social scientists. They came predominantly from other OECD countries, especially from France, the United States, Germany and Italy. Unlike foreign QSE in highly industrialised countries, they were neither particularly young nor particularly highly qualified. Three-quarters had been in Spain less than seven years and nearly 40 per cent less than 18 months. Almost all were employed in industry, mainly in production and management though few worked in R & D. It may be that many of them were working for foreign subsidiaries in Spain.

1) Report on Immigration in Spain, Board for Scientific Development and Co-operation, 1968.

Statistical Appendix

1. Tables	367
2. Notes on main sources	389
3. Statistical sources on migration of scientists and engineers	395

List of Tables

1.	Immigration into Canada and the United States 1958-70, all immigrants, those intending to enter the labour force, professional and technical personnel, engineers, natural scientists and social scientists	369
2.	Immigration of engineers and natural scientists into Canada and the USA 1963-70, by areas of last residence	370
3.	Immigration of natural scientists into Canada and into the USA, 1963-67, by occupation	371
4.	Immigration of engineers into Canada and the USA 1963-67 by occupation	371
5.	Immigration into Canada and the USA, 1963-67, by OECD country of last residence (absolute number and percentage)	372
6.	Immigration into Canada and into the United States by OECD country of last residence, 1963-67 - scientific and technical occupations as a percentage of all those intending to enter labour force	374
7.	Immigrants to North America as a percentage of diplomas awarded by home country by field of science, 1962-67	375
8.	Foreign scientists and engineers in North America by OECD country of origin	376
9.	Foreign natural scientists in North America by subfield	377
10.	Foreign engineers in North America by subfield	378

11.	Ph.D.s as a percentage of all foreign scientists in the United States 1966, by OECD country of origin and area of award	379
12.	a) and b) Immigration into and emigration from Great Britain of persons with qualifications in engineering and technology	380-381
13.	a) and b) Immigration into and emigration from Great Britain of persons with qualifications in science	382-383
14.	Balance of migration of QSEs to and from Great Britain 1958-68	384
15.	Average annual flows of HQM in and out of selected smaller Member countries	385
16.	Flows of highly qualified manpower to and from selected smaller industrialised countries by area of destination/origin	386
17.	Stock of foreign engineers, scientists and physicians, surgeons and dentists in Spain 1966, Sweden 1960 and Switzerland 1966 from Member countries (absolute number)	387
18.	Stock of foreign engineers, scientists and physicians, surgeons and dentists in Spain 1966, Sweden 1960 and Switzerland 1966 from Member countries (percentage)	388

Table 1

IMMIGRATION INTO CANADA AND THE UNITED STATES 1958 - 1970, ALL IMMIGRANTS, THOSE INTENDING TO ENTER THE LABOUR FORCE, PROFESSIONAL AND TECHNICAL PERSONNEL, ENGINEERS, NATURAL SCIENTISTS AND SOCIAL SCIENTISTS¹⁾

a) absolute number

	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970
Total immigration	124,451	120,325	124,111	121,689	124,896	124,451	112,636	146,758	142,743	122,470	134,474	141,571	147,713
Intending to enter the labour force	29,226	26,036	26,538	27,744	29,708	29,226	24,243	24,497	24,743	26,777	24,444	25,579	27,713
Professionals and technical personnel	63,078	55,551	51,673	54,809	56,148	55,551	45,266	60,180	58,710	48,519	55,446	54,182	57,723
Engineers	115,900	119,961	122,557	123,608	124,924	124,900	110,088	135,881	128,518	108,928	120,331	125,784	131,723
of which	7,553	6,947	7,436	7,606	8,218	8,440	13,465	16,654	15,617	10,803	20,250	26,484	22,412
Natural scientists	2,482	2,387	2,140	2,145	2,170	2,140	28,756	28,782	28,019	21,052	48,151	40,417	44,417
Social(2) scientists	1,010	798	725	547	967	1,138	1,476	2,254	3,113	2,704	3,814	2,709	2,186
Teachers	4,032	3,950	3,564	2,893	2,440	4,014	3,775	3,455	4,000	3,852	3,319	7,168	8,509
of which	1,651	1,718	1,476	1,411	1,615	2,197	2,073	1,805	2,124	1,346	5,179	4,634	4,242
Natural scientists	2,381	2,232	1,878	1,479	1,825	1,827	1,686	1,650	1,446	1,476	5,874	2,876	3,063
Social(2) scientists	1,108	1,018	934	942	1,408	1,370	1,688	1,222	1,206	1,654	1,715	1,626	1,317(2)
Teachers	77	59	67	105	152	193	172	159	286	530	455	372	372
of which	..	..	..	..	..	..	..	..	..	..	..	..	..
Natural scientists	..	..	..	..	..	..	..	..	..	..	..	..	..
Social(2) scientists	..	..	..	..	..	..	..	..	..	..	..	..	..
Teachers	..	..	..	..	..	..	..	..	..	..	..	..	..
of which	..	..	..	..	..	..	..	..	..	..	..	..	..
Natural scientists	..	..	..	..	..	..	..	..	..	..	..	..	..
Social(2) scientists	..	..	..	..	..	..	..	..	..	..	..	..	..
Teachers	..	..	..	..	..	..	..	..	..	..	..	..	..
of which	..	..	..	..	..	..	..	..	..	..	..	..	..
Natural scientists	..	..	..	..	..	..	..	..	..	..	..	..	..
Social(2) scientists	..	..	..	..	..	..	..	..	..	..	..	..	..
Teachers	..	..	..	..	..	..	..	..	..	..	..	..	..
of which	..	..	..	..	..	..	..	..	..	..	..	..	..
Natural scientists	..	..	..	..	..	..	..	..	..	..	..	..	..
Social(2) scientists	..	..	..	..	..	..	..	..	..	..	..	..	..
Teachers	..	..	..	..	..	..	..	..	..	..	..	..	..
of which	..	..	..	..	..	..	..	..	..	..	..	..	..
Natural scientists	..	..	..	..	..	..	..	..	..	..	..	..	..
Social(2) scientists	..	..	..	..	..	..	..	..	..	..	..	..	..
Teachers	..	..	..	..	..	..	..	..	..	..	..	..	..
of which	..	..	..	..	..	..	..	..	..	..	..	..	..
Natural scientists	..	..	..	..	..	..	..	..	..	..	..	..	..
Social(2) scientists	..	..	..	..	..	..	..	..	..	..	..	..	..
Teachers	..	..	..	..	..	..	..	..	..	..	..	..	..
of which	..	..	..	..	..	..	..	..	..	..	..	..	..
Natural scientists	..	..	..	..	..	..	..	..	..	..	..	..	..
Social(2) scientists	..	..	..	..	..	..	..	..	..	..	..	..	..
Teachers	..	..	..	..	..	..	..	..	..	..	..	..	..
of which	..	..	..	..	..	..	..	..	..	..	..	..	..
Natural scientists	..	..	..	..	..	..	..	..	..	..	..	..	..
Social(2) scientists	..	..	..	..	..	..	..	..	..	..	..	..	..
Teachers	..	..	..	..	..	..	..	..	..	..	..	..	..
of which	..	..	..	..	..	..	..	..	..	..	..	..	..
Natural scientists	..	..	..	..	..	..	..	..	..	..	..	..	..
Social(2) scientists	..	..	..	..	..	..	..	..	..	..	..	..	..
Teachers	..	..	..	..	..	..	..	..	..	..	..	..	..
of which	..	..	..	..	..	..	..	..	..	..	..	..	..
Natural scientists	..	..	..	..	..	..	..	..	..	..	..	..	..
Social(2) scientists	..	..	..	..	..	..	..	..	..	..	..	..	..
Teachers	..	..	..	..	..	..	..	..	..	..	..	..	..
of which	..	..	..	..	..	..	..	..	..	..	..	..	..
Natural scientists	..	..	..	..	..	..	..	..	..	..	..	..	..
Social(2) scientists	..	..	..	..	..	..	..	..	..	..	..	..	..
Teachers	..	..	..	..	..	..	..	..	..	..	..	..	..
of which	..	..	..	..	..	..	..	..	..	..	..	..	..
Natural scientists	..	..	..	..	..	..	..	..	..	..	..	..	..
Social(2) scientists	..	..	..	..	..	..	..	..	..	..	..	..	..
Teachers	..	..	..	..	..	..	..	..	..	..	..	..	..
of which	..	..	..	..	..	..	..	..	..	..	..	..	..
Natural scientists	..	..	..	..	..	..	..	..	..	..	..	..	..
Social(2) scientists	..	..	..	..	..	..	..	..	..	..	..	..	..
Teachers	..	..	..	..	..	..	..	..	..	..	..	..	..
of which	..	..	..	..	..	..	..	..	..	..	..	..	..
Natural scientists	..	..	..	..	..	..	..	..	..	..	..	..	..
Social(2) scientists	..	..	..	..	..	..	..	..	..	..	..	..	..
Teachers	..	..	..	..	..	..	..	..	..	..	..	..	..
of which	..	..	..	..	..	..	..	..	..	..	..	..	..
Natural scientists	..	..	..	..	..	..	..	..	..	..	..	..	..
Social(2) scientists	..	..	..	..	..	..	..	..	..	..	..	..	..
Teachers	..	..	..	..	..	..	..	..	..	..	..	..	..
of which	..	..	..	..	..	..	..	..	..	..	..	..	..
Natural scientists	..	..	..	..	..	..	..	..	..	..	..	..	..
Social(2) scientists	..	..	..	..	..	..	..	..	..	..	..	..	..
Teachers	..	..	..	..	..	..	..	..	..	..	..	..	..
of which	..	..	..	..	..	..	..	..	..	..	..	..	..
Natural scientists	..	..	..	..	..	..	..	..	..	..	..	..	..
Social(2) scientists	..	..	..	..	..	..	..	..	..	..	..	..	..
Teachers	..	..	..	..	..	..	..	..	..	..	..	..	..
of which	..	..	..	..	..	..	..	..	..	..	..	..	..
Natural scientists	..	..	..	..	..	..	..	..	..	..	..	..	..
Social(2) scientists	..	..	..	..	..	..	..	..	..	..	..	..	..
Teachers	..	..	..	..	..	..	..	..	..	..	..	..	..
of which	..	..	..	..	..	..	..	..	..	..	..	..	..
Natural scientists	..	..	..	..	..	..	..	..	..	..	..	..	..
Social(2) scientists	..	..	..	..	..	..	..	..	..	..	..	..	..
Teachers	..	..	..	..	..	..	..	..	..	..	..	..	..
of which	..	..	..	..	..	..	..	..	..	..	..	..	..
Natural scientists	..	..	..	..	..	..	..	..	..	..	..	..	..
Social(2) scientists	..	..	..	..	..	..	..	..	..	..	..	..	..
Teachers	..	..	..	..	..	..	..	..	..	..	..	..	..
of which	..	..	..	..	..	..	..	..	..	..	..	..	..
Natural scientists	..	..	..	..	..	..	..	..	..	..	..	..	..
Social(2) scientists	..	..	..	..	..	..	..	..	..	..	..	..	..
Teachers	..	..	..	..	..	..	..	..	..	..	..	..	..
of which	..	..	..	..	..	..	..	..	..	..	..	..	..
Natural scientists	..	..	..	..	..	..	..	..	..	..	..	..	..
Social(2) scientists	..	..	..	..	..	..	..	..	..	..	..	..	..
Teachers	..	..	..	..	..	..	..	..	..	..	..	..	..
of which	..	..	..	..	..	..	..	..	..	..	..	..	..
Natural scientists	..	..	..	..	..	..	..	..	..	..	..	..	..
Social(2) scientists	..	..	..	..	..	..	..	..	..	..	..	..	..
Teachers	..	..	..	..	..	..	..	..	..	..	..	..	..
of which	..	..	..	..	..	..	..	..	..	..	..	..	..
Natural scientists	..	..	..	..	..	..	..	..	..	..	..	..	..
Social(2) scientists	..	..	..	..	..	..	..	..	..	..	..	..	..
Teachers	..	..	..	..	..	..	..	..	..	..	..	..	..
of which	..	..	..	..	..	..	..	..	..	..	..	..	..
Natural scientists	..	..	..	..	..	..	..	..	..	..	..	..	..
Social(2) scientists	..	..	..	..	..	..	..	..	..	..	..	..	..
Teachers	..	..	..	..	..	..	..	..	..	..	..	..	..
of which	..	..	..	..	..	..	..	..	..	..	..	..	..
Natural scientists	..	..	..	..	..	..	..	..	..	..	..	..	..
Social(2) scientists	..	..	..	..	..	..	..	..	..	..	..	..	..
Teachers	..	..	..	..	..	..	..	..	..	..	..	..	..
of which	..	..	..	..	..	..	..	..	..	..	..	..	..
Natural scientists	..	..	..	..	..	..	..	..	..	..	..	..	..
Social(2) scientists	..	..	..	..	..	..	..	..	..	..	..	..	..
Teachers	..	..	..	..	..	..	..	..	..	..	..	..	..
of which	..	..	..	..	..	..	..	..	..	..	..	..	..
Natural scientists	..	..	..	..	..	..	..	..	..	..	..	..	..
Social(2) scientists	..	..	..	..	..	..	..	..	..	..	..	..	..
Teachers	..	..	..	..	..	..	..	..	..	..	..	..	..
of which	..	..	..										

Table 2

IMMIGRATION OF ENGINEERS AND NATURAL SCIENTISTS INTO CANADA
AND THE USA - 1969-1970 BY AREAS OF LAST RESIDENCEa) absolute number

	Engineers		Natural scientists	
	Canada	USA(1)	Canada	USA(2)
OECD	13323	26236	6569	9114
Eastern Europe	256	537	170	215
Other industrial	1036	626	518	427
Developing countries	4966	23466	2571	8363
TOTAL	19581	50865	9828	18119

b) percentages

OECD	68.0	51.6	66.8	50.3
Eastern Europe	1.3	1.1	1.7	1.2
Other industrial	5.3	1.2	5.3	2.4
Developing countries	25.4	46.1	26.2	46.1
TOTAL	100.0	100.0	100.0	100.0

c) as a percentage of those intending to enter the labour force(3)

OECD	2.7	4.3	1.3	1.5
Eastern Europe	3.4	2.1	2.3	0.8
Other industrial	4.2	(8.7)	2.1	(5.9)
Developing countries	4.2	4.0	2.2	1.4
TOTAL	3.0	4.1	1.5	1.5

d) 1970 where 1963 = 100

OECD	154	181	251	109
Eastern Europe	900	210	780	375
Other industrial	213	149	296	182
Developing countries	279	319	523	286
TOTAL	182	232	310	185

- 1) Including professors and instructors.
- 2) Including medical professors and instructors, statisticians and instructors.
- 3) Labour force by area is an OECD estimate for USA.

Sources: 5, 20, 21.

Table 3

IMMIGRATION OF NATURAL SCIENTISTS INTO CANADA
AND INTO THE USA - 1963-1967 - BY OCCUPATION

	Number		Percentage		
	Into Canada (1)	Into USA (1)	Canada	USA	
				(1)	(2)
Chemistry	2,273	4,457	47.4	54.0	49.0
Mathematics	274(3)	298	5.7	3.6	6.6
Geology, geophysics	750	451	15.6	5.5	5.4
Physics	531	1,378	11.1	16.7	16.9
Biology	575	661	12.0	8.0	9.2
Agriculture and forestry	395(4)	743	8.2	9.0	8.7
NES	..	267	..	3.2	4.2
TOTAL	4,798	8,255	100.0	100.0	100.0

- 1) Excluding professors and instructors.
 2) Including professors and instructors.
 3) Including "Other physical sciences NES".
 4) Including life sciences "NES".

Sources: 5, 20, 21.

Table 4

IMMIGRATION OF ENGINEERS INTO CANADA AND THE USA
1963-1967 - BY OCCUPATION

Engineers	Number		Percentage		
	Canada	USA	Canada	USA	
				(1)	(2)
Civil	2,717	2,613	23.0	10.6	19.0
Mechanical	3,527	3,988	29.8	16.2	29.0
Industrial	407	882	3.4	3.6	6.4
Electrical	2,730	3,685	22.3	15.0	26.8
Mining	569	210	4.8	0.9	1.5
Chemical	1,177	1,543	9.9	6.3	11.2
Other specified	713	837	6.0	3.4	6.1
Unspecified	..	10,785	..	43.9	-

- 1) Including unspecified.
 2) Excluding unspecified.

Sources: 5, 20, 21.

Table 5

IMMIGRATION INTO CANADA AND THE USA - 1964-1967
BY GEND COUNTRY OF LAST RESIDENCE

a) Absolute number

	Canada			United States			
	Engineers	Natural scientists	Physicians, surgeons, dentists	Engineers Spec. (1) Inspec. (2)	Natural scientists (2)	Physicians, surgeons, dentists	
United States	1,264	830	442				
France	307	133	70	188	203	145	158
Germany	456	171	56	391	315	721	432
Italy	107	137	34	108	114	123	223
Japan	121	56	20	95	85	183	128
United Kingdom	4,930	1,698	1,549	2,384	2,115	1,743	592
Canada				2,153	1,308	1,405	2,194
Austria	156	33	40	80	75	110	113
Switzerland	173	78	34	291	340	313	174
Netherlands	102	33	20	133	120	150	74
Belgium/Luxembourg	76	58	89	66	49	49	87
Finland	10	6	5	12	11	8	11
Norway	53	13	6	235	150	53	37
Sweden	93	27	11	197	286	78	84
Denmark	70	9	3	190	60	30	29
Iceland	**	**	**	**	**	**	**
Greece	42	40	40	163	117	140	132
Yugoslavia	32	23	13	**	**	**	**
Spain	25	21	36	65	33	58	347
Portugal	18	16	10	13	3	74	12
Ireland	87	56	86	80	41	34	125
Turkey	119	20	103	179	112	37	293

1) Includes 50 professors and instructors.

2) Includes statisticians, professors and instructors

Source: 5, 20, 21.

Table 5 (Cont'd)

IMMIGRATION INTO CANADA AND THE USA - 1947-1967
BY COUNTRY OF LAST RESIDENCE

b) percentages (this may not add up to total owing to rounding)

	Canada			United States		
	Engineers (1)	Natural scientists (2)	Physicians, surgeons, dentists (3)	Engineers (4)	Natural scientists (5)	Physicians, surgeons, dentists (6)
United States	10.7	16.6	9.4	1.3	1.9	1.2
France	2.6	2.7	1.5	2.8	7.6	3.5
Germany	3.9	3.4	1.2	0.8	1.1	1.7
Italy	0.9	2.6	0.7	0.7	0.8	1.0
Japan	1.0	1.1	0.4	10.5	19.6	6.8
United Kingdom	41.6	33.9	33.0	13.5	17.7	16.6
Canada	1.3	0.8	0.3	0.6	0.7	0.9
Austria	1.5	1.6	0.7	2.1	3.2	1.3
Switzerland	0.3	2.0	0.4	1.0	1.1	0.6
Netherlands	0.7	1.2	1.9	0.5	0.5	0.7
Belgium/Luxembourg	0.1	0.1	0.1	0.1	0.1	0.1
Finland	0.7	0.4	0.1	0.7	1.4	0.3
Norway	0.8	0.5	0.2	1.4	2.7	0.6
Sweden	0.6	0.3	0.1	1.3	0.6	0.2
Denmark	..	..	..	1.2	1.1	1.5
Iceland	0.4	0.8	0.9	..	..	..
Greece	0.2	0.6	0.4	0.5	0.3	2.6
Yugoslavia	0.2	0.4	2.0	0.1	-	0.1
Spain	0.2	0.4	0.2	0.6	0.4	0.9
Portugal	0.7	1.1	1.8	1.3	1.0	2.2
Ireland	1.0	0.4	2.2	53.6	61.6	42.5
Turkey	69.9	70.8	58.3	..	..	..
OECD	..	..	..	..	..	..

1) Includes 50 professors and instructors.

2) Includes statisticians, professors and instructors.

Sources: 5, 20, 21.

Table 6
IMMIGRATION INTO CANADA AND INTO THE UNITED STATES BY COUNTRY OF LAST RESIDENCE (1962-1967)
SCIENTIFIC AND TECHNICAL OCCUPATIONS AS A PERCENTAGE OF ALL THOSE INTENDING TO ENTER LABOUR FORCE

	Engineers			Natural scientists			Physicians, surgeons and dentists		
	Canada	USA(1) Specified	Unspecified	Average into North America	Canada	USA (1)	Average into North America	USA (1)	Average into North America
France	1.6	1.6	1.7	(1.6)	0.7	1.2	(0.9)	0.4	1.3 (0.7)
Germany	1.7	0.9	1.7	(1.2)	0.6	1.5	(1.0)	0.2	0.9 (0.7)
Italy	0.2	0.2	0.3	(0.2)	0.2	0.4	(0.3)	0.1	0.5 (0.3)
Japan	11.4	4.9	4.3	(7.0)	5.3	7.8	(6.2)	1.9	6.5 (5.2)
United Kingdom	4.4	3.5	3.2	(4.1)	1.5	2.6	(1.8)	1.4	1.3 (1.4)
United States	4.0			(0.2)	2.7			1.4	
Austria	2.5	1.7	1.7	(2.2)	0.6	2.4	(1.3)	0.6	2.5 (1.4)
Belgium	2.3	2.4	1.9	(2.4)	1.7	1.9	(1.8)	2.7	3.3 (3.0)
Denmark	2.2	5.7	2.2	(3.9)	0.3	1.0	(0.6)	0.1	0.9 (0.5)
Finland	0.7	1.4	0.8	(0.8)	0.4	0.8	(0.6)	0.1	0.1 (0.6)
Netherlands	1.2	2.1	1.8	(1.6)	1.2	2.3	(1.6)	0.2	1.1 (0.6)
Norway	6.5	4.2	2.6	(3.9)	1.5	0.9	(1.0)	0.5	0.7 (0.6)
Sweden	5.7	3.1	4.4	(3.6)	1.6	1.2	(1.2)	0.6	1.3 (1.2)
Switzerland	1.9	3.7	4.4	(2.7)	0.9	4.0	(2.3)	0.4	2.2 (1.3)
Canada		2.7	1.8			1.4			2.1
Greece	0.2	1.1	0.8	(0.6)	0.2	0.9	(0.5)	0.2	1.3 (0.7)
Ireland	2.2	0.3	0.3	(0.9)	1.4	0.6	(0.7)	2.2	0.8 (1.1)
Portugal	0.2		0.1	(0.1)	0.2	0.2	(0.2)	0.1	0.1 (-)
Spain	1.0	0.7	0.4	(0.8)	0.8	0.7	(0.7)	4.0	3.9 (4.0)
Turkey	13.8	9.1	5.7	(10.0)	2.3	1.9	(1.8)	12.0	20.5 (4.1)
Yugoslavia	2.0			(..)	2.0			1.2	
All OECD	2.6	2.1	1.8	3.3	1.1	1.5		0.9	1.6

1) "Entering into labour force" data is an OECD estimate.

Sources: 5, 20, 21.

Table 7

IMMIGRANTS TO NORTH AMERICA AS A PERCENTAGE OF DIPLOMAS AWARDED
BY HOME COUNTRY BY FIELD OF SCIENCE - 1962-1967

	Natural science and agriculture	Engineering Science I	Engineering Science II	Medical sciences
Austria 1962-65	6.2	3.0		4.6
Belgium 1962-66	2.4	2.5	1.1	3.6
Canada 1962-64	9.2	20.9		20.2
Denmark 1962-66	3.8	8.5	1.3	1.3
France 1962-66	0.6	1.1	0.9	0.9
Germany 1962-65	5.5	2.7	1.2	1.0
Greece 1962-65	4.2	7.9		6.4
Ireland 1962-65	4.7	14.4		14.2
Italy 1962-64	0.9	0.8		1.4
Japan 1962-65	0.2	0.05	0.3	0.2
Netherlands 1962-66	7.8	5.0	1.0	2.7
Norway 1962-67	4.2	14.6	22.7	3.6
Portugal 1963-65	1.8	3.6	0.7	2.3
Spain 1962-66	1.2	1.4	0.2	4.3
Sweden 1962-67	1.8	5.7		3.0
Switzerland 1962-66	18.1	12.7	4.5	8.6
Turkey 1962-65	0.6	10.8	3.8	9.1
United Kingdom 1962-66	6.2	19.1	2.8	14.7
United States 1962-65	0.2	0.5		0.4

Sources: 5, 20, 21.

Table 8
FOREIGN SCIENTISTS AND ENGINEERS IN NORTH AMERICA BY BIRTH COUNTRY OF ORIGIN (SECONDARY EDUCATION)

	Number		In US Register		Number 1967		Percentage	
	Engineers	Scientists	Engineers	Scientists	Engineers	Scientists	Engineers	Scientists
	(thous.)	(thous.)	(thous.)	(thous.)	(thous.)	(thous.)	(%)	(%)
USA	845	555	280	258	8.2	46.0	1.0	1.4
France	78	37	7,070	1,977	4.4	4.2	18.4	10.8
Germany	310	168	540	586	1.4	0.5	8.8	5.8
Italy	68	46	170	508	..	..	0.3	7.8
Japan	..	..	2,070(1)	1,768	57.3	56.4	94.0(4)	94.2
United Kingdom	1,778	1,446	..	..	..	..	..	..
Canada	..	..	5,480	2,820	..	..	95.5	93.3
Austria	..	..	..	625	..	..	..	3.4
Switzerland	..	..	1,000	456	..	..	5.7	3.5
Netherlands	218	208	476	..	4.6	5.2	7.3	7.3
Belgium/Lux.	..	..	580	114	..	..	2.9	0.6
Finland	..	..	..	159	..	..	..	1.2
Norway	..	..	..	116	..	..	..	0.8
Sweden	51	24	780	102	6.6	0.3	4.3	0.8
Denmark	..	..	100	..	..	..	..	0.6
Ireland	..	..	..	11	..	..	..	0.1
Greece	..	..	..	303	..	..	..	1.7
Yugoslavia	..	..	480	171	..	..	8.3	0.9
Spain	..	..	..	78	..	..	..	0.4
Portugal	..	..	97	11	..	..	0.4	0.1
Ireland	28	18	(4)	112	0.5	0.5	(4)	(5)
Turkey	..	..	280	(116)	..	..	1.2	0.6
OECD	3,468	2,998	11,760	10,150	16.7	75.8	59.8	58.7
Other	1,505	960	9,500	8,074	27.8	24.4	40.2	41.3
Total	4,973	3,958	21,260	18,224	100.0	100.0	100.0	100.0

1) OECD estimate is a per cent of 137,400 engineers in register broken-down in terms of percentage by origin, according to the 1967 sample. The figure is based on the 1966 sample of foreign-born scientists and engineers who were secondary-educated in the country according to the 1966 scientific survey.

2) Percentages based on sample of foreign born 1967.

3) Including Ireland.

4) Grouped with United Kingdom.

Source: 6, 24, 25, and 26.

Table 9

FOREIGN NATURAL SCIENTISTS IN NORTH AMERICA BY SUBFIELD

Field	Percentage				% of national stock			
	Canada 1967(1)		USA 1966		Canada 1967(2)		USA 1966	
	Qual.	Emp.	Registered (3)	Estimate occupied(4)	Qual.	Emp.	(3)	(4)
Chemistry	29.3	31.8	38.3	36.8	19.2	19.0	8.6	7.9
Physics	12.5	11.7	23.4	20.2	18.9	22.5	11.8	12.5
Mathematics	5.9	5.6	10.9	14.4	10.9	14.3	7.0	7.1
Hydrology	15.7	17.1	8.5	4.7	17.1	18.8	4.7	4.9
Other physical	2.0	..	..	..	26.8	..	..	..
All physical	65.4	66.2	81.1	76.1	17.5	19.0	8.3	8.2
Biology	14.8	15.0	17.8	19.2	17.6	21.0	8.8	8.6
Agriculture and forestry	14.8	12.5	1.3	4.7	7.2	7.1	1.9	2.5
Veterinary surgery	4.9	6.0	..	..	12.5	13.9	..	..
Other life sciences	0.1	0.3	..	..	20.0	12.9	..	..
All life sciences	34.6	33.8	19.1	23.9	10.6	11.5	7.1	5.8
TOTAL Natural sciences	100.0	100.0	100.0	100.0	14.3	15.6	7.5	7.5

1) Percentage of foreigners in Canada in natural sciences.

2) Percentage of national stock.

3) Number of National Register 1966.

4) Estimated full number occupied as natural scientists (excluding medical scientists).

Sources: 6, 25 and 26.

Table 10
FOREIGN ENGINEERS IN NORTH AMERICA BY SUBFIELD

	By field			On U.S. Register 1964(2)	% of total Canadian & U.S. stock				
	In Canada 1967(1)		Emp.		in Canada 1967(1)		On U.S. Register 1964(2)		
	Qual.	Emp.			Qual.	Emp.			
Electronic	19.6	7.7	13.5	11.9	10.9	6.4			
Electrical		8.8			9.0	13.2	6.8		
Chemical		3.8			7.5	11.8	6.8		
Petroleum	10.2	11.7	8.5	12.5	13.4	5.7			
Mining/Metallurgy									
Construction		20.2					9.2	17.7	6.8
Environmental control	0.2	0.5	4.0	7.7	7.1	4.2			
Mechanics	24.1	9.1	8.0	15.2	16.4	7.9			
Methods & work simpli- fication/industrial	2.1	11.3	10.8	24.2	11.5	5.2			
Materials and structure	0.3	2.3	8.1	8.1	15.7	8.9			
Physics and Maths	1.1	..	3.7	7.2	..	9.4			
Flight	1.7	1.1	3.7	20.8	14.6	7.9			
Marine	0.9	1.9	1.3	60.6	43.1	8.0			
Other	4.3	21.6	9.1	11.8	14.7	6.4			
No reply	..	..	3.3	..	..	6.2			
TOTAL	100.0	100.0	100.0	13.1	14.3	6.5			

1) Foreign secondary-educated.

2) Sample of foreign-born.

Sources: 6, 24.

Table 11

PH.D.s AS A % OF ALL FOREIGN SCIENTISTS IN THE UNITED STATES
1966 BY OECD COUNTRY OF ORIGIN AND AREA OF AWARD

	Total	Area of award		
		Home country	USA	Other countries
United Kingdom	65.0	47.1	14.3	3.6
Japan	71.3	43.4	27.0	0.9
Germany	59.0	35.7	18.5	4.8
Italy	48.5	29.3	16.7	2.5
France	56.2	17.3	33.3	5.6
Switzerland	72.8	55.4	14.5	2.9
Austria	62.7	37.5	20.6	4.6
Netherlands	62.3	36.1	24.2	2.0
Sweden	52.9	30.8	20.9	1.2
Finland	57.8	24.4	28.9	4.5
Belgium	58.0	20.7	34.2	3.1
Canada	62.5	14.8	45.7	2.0
Denmark	42.0	14.3	24.6	3.1
Norway	47.3	13.6	25.4	8.3
Spain	56.2	30.3	19.7	6.2
Yugoslavia	50.3	13.5	24.4	12.4
Ireland	51.8	11.2	26.4	14.2
Greece	51.6	3.5	44.2	3.9
Turkey	51.0	2.9	38.2	12.4

Sources: 26, 27 and 29.

Table 12(a)

IMMIGRATION INTO GREAT BRITAIN OF PERSONS WITH
QUALIFICATIONS IN ENGINEERING AND TECHNOLOGY

	All immigrants	Economically active			Students(3)	Other inactive
		Total	Engineers	Other(2)		
1958	1,785	1,480	1,080	400	195	110
1959	2,025	1,695	1,240	455	200	130
1960	2,110	1,760	1,285	475	220	130
1961	3,215	2,760	2,035	725	245	210
1962	3,025	2,575	1,890	685	255	195
1963	2,240	1,840	1,340	500	260	140
1964	2,355	1,940	1,425	515	275	140
1965(1)	3,125	2,145	1,935	710	300	180
1966	2,760	2,180	1,595	585	415	165
1967	2,440	2,000	1,465	535	290	150
1968	2,865	2,385	1,740	645	300	180

1) Estimates based on the census.

2) Managers, teachers, medical workers and other occupations.

3) Numbers of overseas students in Great Britain used as an index (See Table 3
Statistics of Education 1968, Vol. 6).

Sources: Office of Population Censuses and Surveys, Council of Engineering
Institutions.

Table 12(b)

EMIGRATION FROM GREAT BRITAIN OF PERSONS WITH
QUALIFICATIONS IN ENGINEERING AND TECHNOLOGY

	All emigrants	Economically active(1)	Students(2)	Other inactive(3)
1958	2,725	2,250	345	130
1959	2,525	1,935	455	135
1960	2,530	1,935	455	140
1961	2,430	1,875	410	145
1962	2,735	2,180	400	155
1963	3,065	2,435	465	165
1964	3,750	3,050	530	170
1965	4,050	3,235	635	180
1966	5,255	4,310	755	190
1967	6,180	5,190	795	195
1968	4,945	3,870	870	205

1) The data provided by the professional engineering institutions do not distinguish the engineers from those in other occupations. The number of university teachers is too small to show separately. New graduates going to posts overseas are included.

2) Great Britain graduates going overseas for research or further study and overseas students who have graduated returning home to their own country.

3) 0.10 per cent of total stock assumed to be emigrating as "other inactive".

Sources: Office of Population Censuses and Surveys, University Grants Committee, Council of Engineering Institutions. Cf. Source 45.

Table 13(a)

IMMIGRATION INTO GREAT BRITAIN OF PERSONS WITH QUALIFICATIONS IN SCIENCE

	All immigrants	Economically active				Students(3)	Other Inactive
		Total	Scientists	Teachers (2)	Other occupations		
1958	3,405	2,595	1,120	565	910	555	255
1959	3,935	3,080	1,525	635	920	580	275
1960	4,100	3,180	1,500	750	930	635	285
1961	4,035	3,005	1,325	765	915	710	320
1962	4,285	3,255	1,550	735	970	730	300
1963	4,220	3,170	1,550	635	985	750	300
1964	3,910	2,820	1,225	595	1,000	790	300
1965(1)	4,880	3,675	1,890	740	1,045	865	340
1966	4,720	3,520	1,670	845	1,005	860	340
1967	4,160	2,975	1,260	665	1,050	860	325
1968	4,370	3,745	1,845	840	1,060	865	360

1) Estimates based on the census.

2) Excluding university teachers. Up to 1963 estimates are based on the sea manifests. From 1964 onwards estimates are based on census information and the International Passenger Survey.

3) Number of overseas students in Great Britain used as an index (see Table 3 Statistics of Education, 1968, Vol. 6).

Sources: Office of Population Censuses and Surveys, Council of Science and Technology Institutes.

Table 13(b)

EMIGRATION FROM GREAT BRITAIN OF PERSONS WITH QUALIFICATIONS IN SCIENCE

	All emigrants	Economically active				Students(3)	Other(4) Inactive
		Total	Scientists (1)	Teachers (2)	Other occupations		
1958	2,885	2,135	1,260	670	205	530	220
1959	2,855	1,970	1,150	630	190	655	230
1960	2,695	1,785	1,065	530	190	665	245
1961	3,135	2,150	1,275	650	225	725	260
1962	3,100	2,210	1,325	660	225	615	275
1963	3,490	2,420	1,560	595	265	780	290
1964	3,880	2,745	1,805	640	300	830	305
1965	4,240	3,030	1,990	720	320	885	325
1966	4,470	3,195	2,180	670	345	935	340
1967	4,895	3,585	2,295	945	375	950	360
1968	4,995	3,460	2,215	875	370	1,155	380

1) Data obtained from sea manifests, immigration authorities of recipient countries, University Grants Committee, science institutes and International Passenger Survey. New graduates going to posts overseas are included.

2) For teachers, the IPS ratio of immigrants/emigrants has been used to convert the figure (based on the census) of science teachers who immigrated in 1965 into an estimate of emigrants. The time-series post-1964 has been prepared by using IPS data as an index of change. The link between 1963 and 1964 was made using the "scientist" series.

3) Graduates from Great Britain going overseas for research or further study and overseas students returning to their own country.

4) 0.19 per cent of total stock assumed to be emigrating as "other inactive".

Sources: Office of Population Censuses and Surveys, University Grants Committee, Council of Science and Technology Institutes.

Table 14

BALANCE OF MIGRATION OF QSEs TO AND FROM GREAT BRITAIN 1958 TO 1968

	Emigration		Immigration		Balance of migration	
	All emigrants	British and Commonwealth only	All immigrants	British and Commonwealth only	All migrants	British and Commonwealth only
<u>All migrants</u>						
1958	5,610	5,055	5,190	3,965	- 420	-1,090
1959	5,380	4,875	5,960	4,455	+ 580	- 420
1960	5,725	4,725	6,210	4,675	+ 985	- 50
1961	5,505	4,990	7,250	5,495	+1,685	+ 505
1962	5,835	5,240	7,310	5,505	+1,475	+ 265
1963	6,555	5,870	6,460	4,330	- 95	- 940
1964	7,630	6,845	6,265	4,735	-1,365	-2,110
1965	8,290	7,440	8,005	6,135	- 285	-1,305
1966	9,725	8,830	7,480	5,820	-2,245	-3,010
1967	11,075	10,150	6,600	5,230	-4,475	-4,920
1968	9,940	8,985	7,835	6,050	-2,105	-2,935
<u>Engineering and technology</u>						
1958	2,725	2,565	1,785	1,340	- 940	-1,225
1959	2,525	2,390	2,025	1,520	- 500	- 870
1960	2,530	2,395	2,110	1,585	- 420	- 810
1961	2,430	2,300	3,215	2,410	+ 785	+ 110
1962	2,735	2,580	3,025	2,265	+ 290	- 315
1963	3,065	2,890	2,240	1,690	- 825	-1,200
1964	3,750	3,540	2,355	1,785	-1,395	-1,755
1965	4,050	3,820	3,125	2,355	- 925	-1,465
1966	5,255	5,025	2,760	2,080	-2,495	-2,945
1967	6,480	5,980	2,440	1,835	-3,740	-4,145
1968	4,945	4,715	2,865	2,155	-2,080	-2,560
<u>Science</u>						
1958	2,885	2,490	3,405	2,625	+ 520	+ 135
1959	2,855	2,485	3,935	2,935	+1,080	+ 450
1960	2,695	2,330	4,100	3,090	+1,405	+ 760
1961	3,135	2,690	4,035	3,085	+ 900	+ 395
1962	3,100	2,660	4,285	3,240	+1,185	+ 580
1963	3,490	2,980	4,220	3,240	+ 730	+ 260
1964	3,880	3,305	3,910	2,950	+ 30	- 355
1965	4,240	3,620	4,880	3,780	+ 640	+ 160
1966	4,470	3,805	4,720	3,740	+ 250	- 65
1967	4,895	4,170	4,160	3,395	- 735	- 775
1968	4,995	4,270	4,970	3,895	- 25	- 375

Source: Ministry of Technology. Cf. Source 45.

Table 15

AVERAGE ANNUAL FLOWS OF HIGH IN AND OUT OF SELECTED SMALLER MEMBER COUNTRIES

	Outflow		Inflow		Balance	
	National	Foreigners	National	Foreigners	National	Foreigners
Engineers						
Sweden I(1)	61	70	32	113	- 23	+ 43
Sweden II(2)	..	..	..	..	..	..
Netherlands(3)	260	264	236	432	- 25	+ 163
Switzerland(4)	210	..	205	..	- 5	(+ 405)
Natural scientists						
Sweden I(1)	14	21	10	23	- 4	+ 2
Sweden II(2)	..	..	..	..	..	..
Netherlands	..	..	..	..	..	..
Switzerland(4)	144	..	122	..	- 22	(+ 152)(5)
Medical personnel						
Sweden I(1)	13	26	5	72	- 7	+ 45
Sweden II(2)	..	..	..	..	..	..
Netherlands(6)	139	50	136	71	- 3	+ 21
Switzerland(4)	105	..	34	..	- 11	(+ 46)(5)
Social scientists						
Sweden I(1)	42	7	3	13	- 33	+ 5
Switzerland(2)	47	..	44	..	- 3	..
University teachers						
Sweden II(2)	..	..	..	..	..	..
Switzerland(2)	..	..	..	..	..	..
Netherlands I(7)	..	..	..	..	..	..
Netherlands II(8)	1	1	..	..	..	..

1) "Qualified as" annual average inflow 1954-59, outflow 1961 and 1962.

2) "Occupied as" annual average inflow 1954-59 and outflow 1961 and 1962.

3) Annual average 1963-1964.

4) Annual average 1961-1967.

Sources: 8, 10 and 13.

5) Estimate of net change in stock of foreigners in Switzerland.

6) Annual average 1960-1965.

7) Annual average - University teachers.

8) Annual average - Graduates employed in private sector.

Table 16
 FLOWS OF HIGHLY QUALIFIED MANPOWER TO AND FROM SELECTED SMALLER INDUSTRIALISED COUNTRIES
 BY AREA OF DESTINATION/ORIGIN

			Annual average				Percentage			
			North America	Europe	NES (1)	Total	North America	Europe	NES (1)	Total
<u>Engineers</u>										
Netherlands(2)	Dutch	Emig.	37	95	128	260	14.5	36.4	49.1	100.0
		Repat.	29	66	140	235	12.4	28.1	59.5	100.0
		Balance	- 8	-29	+12	-25	-	-	-	-
	Foreign	Re-emig.	73	144	47	264	27.7	54.4	17.9	100.0
		Immig.	133	232	67	432	30.7	53.8	15.5	100.0
		Balance	+60	+88	+20	+168	35.7	52.4	11.9	100.0
Total	Balance	52	59	32	143	36.4	41.2	22.4	100.0	
Switzerland(3)	Swiss	Emig.	78	81	51	210	37.0	38.4	24.6	100.0
		Repat.	65	84	56	205	31.8	41.0	27.2	100.0
		Balance	-13	+ 3	+ 5	- 5	-	-	-	-
<u>Medical personnel</u>										
Netherlands(4)	Dutch	Emig.	23	28	88	139	16.2	20.4	63.4	100.0
		Repat.	18	24	94	136	13.0	17.3	69.7	100.0
		Balance	- 5	- 4	- 6	- 3	-	-	-	-
	Foreign	Re-emig.	6	36	8	50	12.7	71.2	16.1	100.0
		Immig.	4	50	17	71	5.7	70.2	24.1	100.0
		Balance	- 2	+14	+ 9	+21	-	-	-	-
Total	Balance	- 7	10	15	18	-	-	-	-	
Switzerland(3)	Swiss	Emig.	47	38	20	105	44.4	36.4	19.2	100.0
		Repat.	42	35	17	94	44.5	37.5	18.0	100.0
		Balance	- 5	- 3	- 3	-11	45.5	27.3	27.2	100.0
<u>Natural scientists</u>										
Switzerland(3)	Swiss	Emig.	70	44	30	144	48.2	30.7	21.1	100.0
		Repat.	55	40	27	122	44.7	33.1	22.1	100.0
		Balance	-15	- 4	- 3	-22	68.1	18.2	13.7	100.0
<u>Social scientists</u>										
Switzerland(3)	Swiss	Emig.	15	23	9	47	31.5	49.5	19.1	100.0
		Repat.	14	22	8	44	32.4	49.6	18.1	100.0
		Balance	- 1	- 1	- 1	- 3	-	-	-	-
Sweden(5)	Total	Emig. & Re-em.	64	222	102	388	16.5	57.2	26.3	100.0
		Immig. & Repat.	39	302	52	393	9.9	76.8	13.3	100.0
		Balance	-25	+80	-50	+ 5	-	-	-	-

1) Developing and other.

2) 1963-1964.

3) 1960-1964.

4) 1960-1965.

5) Inflow 1958-1959, outflow 1961 and 1962 all Swedish and foreign graduates.

Sources: 8, 10 and 13.

Table 17

STOCK OF FOREIGN ENGINEERS, SCIENTISTS AND PHYSICIANS, SURGEONS AND DENTISTS IN SPAIN 1966(1)
SWEDEN 1960(2) AND SWITZERLAND 1966(3) FROM MEMBER COUNTRIES

	Engineers			Natural scientists			Physicians, surgeons & dentists			Absolute number of statisticians	
	Spain 1966	Sweden 1960 (4)	Switzerland 1966 (5)	Spain 1966	Sweden 1960 (6)	Switzerland 1966 (7)	Spain 1966	Sweden 1960	Switzerland 1966 (8)	Spain 1966	Switzerland 1966
Germany	32	489	5,840	5	96	..	1	445	590	4	..
France	52	52	830	10	6	..	1	11	100	8	..
Italy	18	25	2,000	4	5	..	3	18	560	2	..
Japan	-	12	..	-	1	..	-	3	..	-	..
United Kingdom	15	93	..	4	18	..	-	13	..	4	..
United States	23	167	..	7	31	..	2	43	..	10	..
Austria	5(10)	105	1,540	..	33	..	..	94	120	..	..
Switzerland	5	51	..	17	5	..	1	2	..	1	..
Canada	1(10)	6	..	..	..	..	..	..	..	..	..
Denmark	3(10)	304	..	..	32	..	..	323	..	..	..
Finland	1(10)	372	..	..	114	..	..	113	..	..	..
Iceland	-	18	..	-	3	..	..	47	..	-	..
Norway	-	372	..	-	91	..	..	115	..	-	..
Sweden	10	..	..	..	..	..	2	..	..	2	..
Belgium/Luxembourg	12	17	..	1	1	..	4	5	..	4	..
Netherlands	7	19	..	1	5	..	2	5	..	2	..
Spain	15	..	..	..	..	..	..	6	..	..	..
Portugal	1(10)	1	..	..	..	..	..	..	..	..	..
Greece	-	14	..	..	..	..	..	9	..	..	..
Yugoslavia	-	27	..	..	7	..	..	10	..	..	..
Ireland	3(10)	6	..	..	..	..	..	..	..	..	..
Turkey	-	17	..	..	1	..	..	7	..	..	..

1) Main professional competence and country of secondary education.

2) University graduates by occupation and birthplace.

3) Estimated by occupation.

4) Includes architects.

5) Engineers, physical scientists and technicians.

6) Includes veterinary surgeons.

7) Partially included in engineers.

8) Includes pharmacists and veterinary surgeons.

9) Information for Sweden and Switzerland not available.

10) Includes natural, social and medical scientists.

11) Included under engineers.

Sources: 9, 11, 12 and 13.

Table 19

STATE OF FOREIGN ENGINEERS, SCIENTISTS AND PHYSICIANS, SURGEONS AND DENTISTS IN SPAIN 1966(1)
SWEDEN 1960(2) AND SWITZERLAND 1966(3) FROM MEMBER COUNTRIES

As a % of all foreign scientists, engineers and physicians and physicians, surgeons and dentists

	Engineers			Natural scientists			Physicians, surgeons & dentists			Social scientists (%)
	Spain 1966	Sweden 1960 (4)	Switzerland 1966 (5)	Spain 1966	Sweden 1960 (6)	Switzerland 1966 (7)	Spain 1966	Sweden 1960	Switzerland 1966 (8)	
Germany	14.7	15.0	41.8	12.5	12.1	..(7)	5.3	25.3	30.3	8.0
France	24.0	1.6	6.0	25.0	0.8	..(7)	5.3	0.6	5.1	16.0
Italy	8.3	0.8	14.3	10.0	0.6	..(7)	15.8	1.8	33.0	4.0
Japan	-	0.4	..	-	0.1	..	-	0.1	..	-
United Kingdom	6.9	2.9	..	10.0	2.3	..	-	0.7	..	8.0
United States	10.6	5.1	..	17.5	3.9	..	19.5	2.8	..	20.8
Austria	(10)	3.2	11.1	(10)	4.2	..(7)	(10)	5.4	6.2	(10)
Switzerland	1.8	1.6	~~..~~	45.5	0.6	..	5.3	0.1	..	2.0
Canada	(10)	0.2	..	(10)	0.5	..	(10)	0.3	..	(10)
Denmark	(10)	9.3	..	(10)	4.0	..	(10)	18.4	..	(10)
Finland	(10)	11.4	..	(10)	14.4	..	(10)	8.4	..	(10)
Iceland	-	0.6	..	-	0.4	..	-	2.8	..	-
Norway	-	11.4	..	-	11.5	..	-	5.5	..	-
Sweden	4.6	~~..~~	~~..~~	~~..~~	~~..~~	~~..~~	~~..~~	~~..~~	~~..~~	~~..~~
Belg./Lux.	5.5	0.5	..	2.5	0.1	..	-	0.3	..	4.0
Netherlands	3.2	0.6	..	2.5	0.8	..	-	0.3	..	8.0
Spain	-	0.5	..	-	-	..	-	0.3	..	4.0
Portugal	(10)	-	..	(10)	-	..	(10)	-	..	(10)
Greece	-	0.4	..	-	-	..	-	0.5	..	-
Yugoslavia	-	0.8	..	-	0.9	..	-	0.6	..	-
Ireland	(10)	0.2	..	(10)	-	..	(10)	-	..	(10)
Turkey	-	0.5	..	-	0.1	..	-	0.4	..	-

1) Main professional competence and country of secondary education.

2) University graduates by occupation and birthplace.

3) Estimated by occupation.

4) Includes architects.

5) Engineers, physical scientists and technicians.

6) Includes veterinary surgeons.

7) Partially included in engineers.

8) Includes pharmacists and veterinary surgeons.

9) Information for Sweden and Switzerland not available.

10) Percentages have not been calculated owing to lack of detail.

Sources: 9, 11, 12 and 13.

2. NOTES ON MAIN SOURCES

The main statistical sources and characteristics of the data are as follows:

I. NORTH AMERICA

A) Immigration of Foreigners

i) Canada

Data for landed immigrants, country of last residence, and statement of intended occupation. Scientists and Engineers excluding teachers. (All levels).

ii) United States

Natural Science Foundation Reports of Immigration Data

Immigrants by country of last residence and statement of intended occupation. Professors and instructors in science and engineering are included but are separately available. Only about half the incoming engineers state a speciality. The remainder, referred to as "unspecified", are sometimes considered to be technician level only.

iii) Remarks

Immigration for any one year may contain a number of scientists and engineers who had already entered the country with other classes of visa and subsequently "adjusted status" to become immigrants. A certain proportion of immigrants do not enter from their country of origin (defined in the OECD study as country of secondary school graduation) but have had "last residence" in another country.

B) Stocks of Foreign Scientists

i) Canada

Preliminary Data from Survey of Highly Qualified Manpower 1967
Department of Manpower and Immigration (print-out)

The data are drawn from a special survey of all HQM (engineers, natural and social scientists and social workers, architects etc). The material is fully grossed up. Foreigners are those who completed their secondary education abroad and the country of origin is the country of secondary school graduation. There is reason to believe that the survey results may underestimate the number of foreigners because of their greater mobility. Stock is broken down both by field of qualification and by area of occupation.

ii) United States

Biennial registrations of members of professional societies
co-ordinated by The National Science Foundation (NSF)

The data for engineers are taken from a survey of a sample of approximately 1 in 10 Members of Engineering Societies. The grossing up is an OECD estimate. Foreigners are identified by country of birth but have been adjusted to country of secondary education at the OECD. Engineers are broken down by primary professional competence.

The data for scientists are taken from the 1964 and 1966 surveys of Members of Scientific Societies with "full professional standing" as determined by the individual societies. According to the NSF the respondents to the survey represent 60-75% of the full number eligible for Membership. Foreigners are identified by country of completed secondary education. A further OECD broad estimate has been made of the total number of foreigners occupied as Scientists and Engineers. Scientists are broken down by primary professional competence.

II. THE UNITED KINGDOM

Persons with Qualifications in Engineering, Technology and Science 1959-1968 - Study undertaken at the Department for Trade and Industry

Flow Data

National estimates assembled from annual returns made by professional and engineering societies, surveys by the University Grants Committee, Australian Canadian and U.S. immigration data, the International Passenger Survey, the Department of Overseas Development, etc. They include all persons with qualifications in engineering, science and technology and are divided into: (i) Science (ii) Engineers (by subject of original classification) and by origin between (i) British Commonwealth (ii) All others. All migrating QSE are included whether or not they are economically active.

Stock Data

QSE born abroad registered in the 1961 and 1966 censuses divided between those born in the Commonwealth or the Irish Republic and "other foreign". Separate data is given for Engineering and Technology and Science.

III. SWEDEN

Number of persons with Higher Education in Sweden who immigrated from Abroad and other studies by

Friberg for Swedish Research Council Committee on Research Economics

Flow Data

The information is based on the Census of 1960 and on annual Church Parish registration. It covers all university graduates whether Swedish or Foreign: (i) who entered Sweden in 1958 and 1959 and were registered in the Census; (ii) who were included in the Census and who registered an intention to emigrate in 1960 and 1962. (The church registers include the full census number of each person).

Stock Data

The information covers foreign born university graduates registered in the 1960 census. The characteristics noted were for total foreign born, country of birth (plus nationality on entry and last residence), sex, age, period of entry, level and field of qualification, occupation and sector of employment. Data is also given by country of birth of re-emigration in 1960-1966 and re-immigration (of re-emigrants) in the same period.

IV. SWITZERLAND

"Brain Drain oder Brain Gain"?, R. Guiccardi

Flows

Data based on military records of 150,000 men who checked in or out of Switzerland of whom 14,000 noted a professional or academic occupation or qualification.

Includes male citizens aged 20-50 (soldiers and non-commissioned officers), 20-55 (officers) and not fit for service (20-50), resident abroad more than three months, checked as departing or returning by the military authorities in 1960-1967 and mentioning a professional or academic occupation or qualification. Four characteristics were recorded. Occupation (100% response); level of qualification (53%); age, and country of origin or destination.

Stock

Total foreign scientists and engineers registered in the 1960 census by occupation. This was also fused together with highly aggregated stock data concerning non-permanent resident foreign manpower in Switzerland, published bi-annually in "Die Volkswirtschaft" (The Economy), Bern, to estimate total foreign PTP in Switzerland 1959-1967.

V. THE NETHERLANDS

Report of the Working Group "Emigratie Geleerden" of the Koninklijke Nederlandse Academie van Wetenschappen.

Flow and partial stock

- a) Flows of Dutch and foreign engineers leaving and entering the Netherlands in 1963 and 1964, Dutch and foreign medical professionals and university professors leaving and entering the Netherlands between 1960 and 1965 by occupation, by country of destination and last residence (except university professors).
Adapted from migration data collected by the Netherlands Central Statistical Office.
- b) Questionnaire survey of Dutch and foreign members of university science staff and university graduates employed in private institutes and enterprises, leaving or entering the Netherlands for 1954-1955 to 1964-1965 by field, nationality and country of destination.
- c) Partial stock of Dutch engineers resident abroad as at 1st November, 1964 who graduated from the University of Delft between 1945 and 1965 taken from the Year-book of Delft engineers, 1965 registration list of the Dutch Royal Institute of Engineers (The Hague).

VI. IRELAND

The Irish Brain Drain - R. Lynn, which quoted:

- A cohort survey of intentions was undertaken by Professor Forester in 1967 covering students of Irish nationality in the four Irish university colleges (UCC, UCD, UCG, and Trinity College) reading commerce, engineering and science who intended: to emigrate on graduation or to emigrate at some later date.
- A cohort survey by the Irish Institute for Economic and Social Research of the intentions of a sample of 160 male students at University College, Dublin covering students

in all fields who intended to emigrate temporarily from Ireland.

- A survey by the South Ireland Faculty of the College of General Practitioners of 408 doctors graduating from UCC between 1945 and 1954 of which 60 per cent were abroad in 1964.
- A survey by the IIESR of a sample of students graduating from UCD in 1952 of which 271 were abroad.

VII. NORWAY

The data was collected by the relevant Norwegian Research Councils.

VIII. SPAIN

Report on Immigration in Spain by
General Directorate for Scientific Promotion and Co-operation -
Ministry of Education and Science.

The survey is a stock study of foreign scientists and engineers in Spain in 1968. Countries of origin were identified by country of completed secondary education. The following characteristics were identified: country of origin, main professional competence, year of entry to Spain, age, primary activity, and sector of employment.

3. STATISTICAL SOURCES ON MIGRATION OF SCIENTISTS AND ENGINEERS

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5. Canadian Immigration Statistics 1963-1970.
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Department of Manpower and Immigration (print-out).
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K.V. Pankhurst,
The Annals of the American Academy of Political and Social Science,
Philadelphia, Vol. 367 (September 1966), pp. 53-62.

DENMARK

41. Material received from the Danish Advisory Council for Science Policy.

IRELAND

7. The Irish Brain Drain.
R. Lynn,
The Irish Institute for Social and Economic Research,
paper 43, 1968.

NETHERLANDS

8. * Report of the Working Group "Emigratie Geleerden",
Koninklijke Nederlandse Academie van Wetenschappen
(mimeographed in Dutch).

NORWAY

30. The Problems of a Small Scientific Community:
The Norwegian Case.
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Minerva, Vol. VII, No. 3.
36. Norske Sivil ingeniører med eksamen fra årene 1959-1963,
B. Bassøe, Teknisk Ukeblad reprint (in Norwegian).

SPAIN

9. * Report on Immigration in Spain.
General Directorate for Scientific Promotion and
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SWEDEN

10. A first preliminary report concerning an investigation
by the Committee regarding the migration of scientists
to/from Sweden,
Friborg, Swedish Research Council Committee in Research
Economics, Report 20, (English translation now available).

11. * Number of Persons with Higher Education in Sweden who Immigrated from Abroad,
Friborg, Swedish Research Council Committee on Research Economics, Report No. 34, (English translation available).
12. Additional material received from the Committee on Research Economics (print out).

SWITZERLAND

13. * Brain Drain oder Brain Gain?
R. Guiccardi for the Institut für Sozialwissenschaften of the University of Basel, 1969, (in German).

UNITED KINGDOM

14. The Brain Drain,
Report of the Working Group on Migration, Cmd. 3417, HMSO, 1967.
15. Persons with Qualifications in Engineering Technology and Science 1959-1968,
DTI, HMSO, London, 1971.
15. The Flow into Employment of Scientists, Engineers and Technologists.
16. Graduate Study and After,
S. Hatch and E. Rudd,

UNITED STATES

17. Scientific Manpower from Abroad. United States Scientists and Engineers of Foreign Birth and Training,
National Science Foundation 62.24.
18. Scientists and Engineers from Abroad 1962-1964,
National Science Foundation 62.24.
19. Some Facts and Figures on the Migration of Talent and Skills,
Council on International Education and Cultural Affairs,
Dept. of State, 1967.

20. The Brain Drain into the United States of Scientists and Engineers and Physicians.
Staff Study for the Research and Technical Programmes, Sub-Committee of the Committee on Government Operations of the House of Representatives, U.S. Government Printing Office 1967 (81-7160).
21. The Brain Drain of Scientists, Engineers and Physicians From Developing Countries into the United States.
Hearing before a Sub-Committee of the Committee on Government Operations, House of Representatives, January 1968. U.S. Government Printing Office, (89-921).
22. Scientists, Engineers and Physicians from Abroad-Fiscal Year 1965.
NSF Reviews of Data on Science Resources No. 13, March 1968.
23. Annual Indicator of the Immigration into the United States of Aliens in Professional and Related Occupations. Annual publication issue to Fiscal Year 1970.
Bureau of Educational and Cultural Affairs, Department of State.
24. * Characteristics of Foreign-Born Engineers in the United States, 1964.
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H. Grubel, University of Pennsylvania under National Science Foundation Grant, 1978 (mimeo.).
27. Scientific Personnel and the Professions
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28. Scientists, Engineers and Physicians from Abroad Fiscal years 1966 and 1967. NSF 69-10.

ADDITIONAL MATERIAL ON TOTAL STOCKS OF SCIENTISTS AND ENGINEERS

CANADA

- 31. Labour Force Characteristics of Post-War Immigrants and Natural born Canadians 1956-67, DBS Special Labour Force Studies No. 6
- 39. Canada's Highly Qualified Manpower Resources,
Department of Manpower and Immigration, 1970.

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- 35. Report on the 1965 Triennial Manpower Survey of Engineers, Technologists, Scientists and Technical Support Staff,
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- 28. American Science Manpower 1964,
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- 29. American Science Manpower 1966,
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- 32. Employment of Scientists and Engineers in the United States 1950-1966, NSF 68.30.
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- 44. The Engineering Profession: A New Profile,
A report of the National Engineers Register - Engineering Joint Council.

ANNEXES

I. AGENDA

MONDAY 25TH OCTOBER 1971

PLENARY SESSION

Chairman: Mr. Pier-Luigi ROMITA,
Under-Secretary of State for
Public Instruction (Italy);
President of the Conference

A. Purpose

To define the general orientation of the Conference and
bring together the points of view of Education, Employment,
Industry.

B. Themes

1. Utilisation and education of highly qualified manpower,
the problems: presentation of the themes of the
Conference.
2. The utilisation of highly qualified manpower:
 - a) the point of view of industry;
 - b) the point of view of highly qualified manpower.
3. Education policies and the socio-economic context.

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* *

B. Themes

1. Insertion of new graduates, improvements of qualifications and updating.
2. The absorption of young unemployed graduates.
3. Reconversion.
4. Individual development and upgrading.

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WEDNESDAY 27TH OCTOBER 1971

PLENARY SESSION

POLICIES AND INSTITUTIONS

Chairman: Mr. Pier-Luigi ROMITA,
Under-Secretary of State for
Public Instruction (Italy)
President of the Conference

A. Purpose

A synthesis of the main policy problems and future prospects.

B. Themes

1. Discussion of the conclusions of Groups I and II.
 - a) Careers and mobility: conclusions of Group I;
 - b) Training in the course of active life: conclusions of Group II.
2. New perspectives in educational objectives and structures.

PLENARY SESSION
EMPLOYMENT AND EDUCATION PROSPECTS

Chairman: Mr. Malcolm R. LOVELL,
Assistant Secretary for Manpower,
U.S. Department of Labor (U.S.A.)

A. Purpose

To analyse the evolution of employment and education problems
and the results of present policies.

B. Themes

1. Evolution of the nature of employment problems.
2. Supply and requirements of qualifications.
3. The utilisation of available qualifications.
4. The role of education in the production of qualifications.

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* *

TUESDAY 26TH OCTOBER 1971

GROUP I

CAREERS AND MOBILITY

Chairman: Dr. G.N. PERRY,
Assistant Deputy Minister
in the Programme Development
Service of the Ministry of
Manpower and Immigration (Canada)

A. Purpose

On the basis of confrontation of concrete policies and practices, to arrive at the formulation of new concepts for careers and mobility.

B. Themes

1. Policies and practices concerning mobility.
2. The operation of the labour market for highly qualified manpower.
3. Employment difficulties of highly qualified manpower in mid-career.
4. New concepts of careers and mobility.

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* *

GROUP II

EDUCATION AND TRAINING IN THE COURSE
OF THE WORKING LIFE

Chairman: M. le Recteur J. CAPELLE,
Rapporteur de la Commission des
Affaires culturelles, familiales
et sociales de l'Assemblée
Nationale (France)

A. Purpose

To clarify the existing two aspects of complementary in-career education as an instrument of the personnel policy of a firm and as an instrument of a national policy for adaptation and to develop the concept of an industry-education partnership.

3. Institutional arrangements for a national utilisation policy.
4. Conclusions and recommendations.

*
* *

II. LIST OF DOCUMENTS SUBMITTED
TO THE CONFERENCE

Three categories of documents have been prepared for the Conference.

1. Discussion papers to guide the discussion in the course of the Conference sessions.
2. Basic documents giving an overall presentation of the major themes of the Conference.
3. Reference papers, mostly submitted by national delegations, which will serve to illustrate the specific items on the Agenda of the Conference.

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* *

DISCUSSION DOCUMENTS

	<u>Code</u>
A. Employment Prospects in the 70s.	ED(71)17
B. Mobility and Career Development.	ED(71)16
C. Further Education and Training of Highly Qualified Personnel.	ED(71)15
D. Main Policy Problems: An Overview.	ED(71)14

BASIC DOCUMENTS

1. National Policies and Institutional Arrangements, Dean Seymour, L. Wolfbein	ED(71)4
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| 6. Employment Prospects in the 70s.
Report by the Secretariat. | ED(71)11 |
| 7. Further Education and Training of Highly
Qualified Personnel.
Report by the Secretariat. | ED(71)12 |

BACKGROUND DOCUMENTS

Employment - Mobility - Careers

- | | |
|--|--------------------------------------|
| 2. Forecasting of requirements and employment of
Highly Qualified Manpower in the Mechanical
Engineering Industry, Germany.
B. Lutz and others. | ED(71)6 |
| 4. Evaluation of the Utilisation of University
Graduates in Industry, Italy.
Italian Committee, Working Group III. | DAS/EID/71.1 |
| 5. Evolution of the Structure of the Labour Force
in Japan.
T. Wakana. | DAS/EID/71.20 |
| 9. Manpower Utilisation in the electronics
industry in the United Kingdom. | DAS/EID/71.29 |
| 10. Utilisation of Highly Qualified Personnel,
Yugoslavia.
The Utilisation of Knowledge and Working Time
of Highly Qualified Personnel, Yugoslavia.
P. Kogelj. | DAS/EID/71.30
Part II
Part III |
| 13. Employment Prospects in the 70s.
United Kingdom. | DAS/EID/71.33
Part I |
| 14. Expanding Use of Highly Qualified Manpower;
conditions and consequences, Germany.
W. Armbruster. | DAS/EID/71.28
Part I |
| 18. Prospects in the Evolution of Employment
Conditions, Sweden. | DAS/EID/71.41 |
| 19. A Review of Deployment and Mobility of Highly
Qualified Manpower in the United States.
R. McGinnis. | DAS/EID/71.61 |
| 20. Employment and Occupational Mobility of Highly
Qualified Personnel in France.
B. Grais and R. Sallais. | DAS/EID/71.59
Part I |

21. Employment Prospects of College-educated Workers. United States,
M. R. Lovell. ED(71)20
22. International Movements of Scientists and Engineers in the 60s as an aspect of mobility of Highly Qualified Manpower.
Report by the Secretariat. DAS/EID/71.57
24. The Utilisation of Highly Qualified Manpower. United Kingdom,
Barry T. Turner. DAS/EID/71.60
25. Utilisation of Highly Qualified Personnel in a multinational Firm.
P.E. Starr. DAS/EID/71.65
26. Career Opportunities for Associate Professional Manpower, United States,
H. Matthews. DAS/EID/71.64

Complementary In-Career
Education and Training

3. The Training of Scientific and Technical Staff in Italian Firms,
Italian Committee, Working Group VI. ED(71)2
2. Evaluation of some Highly Qualified Personnel Training Activities, Italy,
Italian Committee, Working Group II. DAS/EID/71.1
13. The contribution of Industrial Training Boards to in-career Education and Training. DAS/EID/71.33
The experiment of the "matching sections" Part II
for young graduates, United Kingdom. Part III
In-Career Education for Highly Qualified Personnel: an outline of the Contribution Part IV
of the Educational System in Great Britain.
16. Recurrent Education Policy: Proposals and Debate in Norway, DAS/EID/71.55
A. Dalin.
17. Education and Training Requirements of Highly Qualified Personnel, Spain, DAS/EID/71.42
Spanish Committee.

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| 23. Further In-Career Training in Medicine,
United Kingdom,
Dr. J.R. Ellis. | DAS/EID/71.4 |
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Education-Employment Relationships

- | | |
|--|----------------------------------|
| 4. Adapting Engineering Education to Economic
Needs. Italy,
Italian Committee, Working Group I.
Factors influencing Vocational Orientation,
Italy,
Italian Committee, Working Group IV. | DAS/EID/71.1 |
| 8. The Allocation of Labour and the Consequences
for Educational Policy,
Report by the Secretariat. | DAS/EID/71.27 |
| 10. Collaboration between the Economy and Higher
Education Institutions in Yugoslavia. | DAS/EID/71.30
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| 11. Utilisation of Graduate Economists in the
Netherlands,
P. Nicolas. | DAS/EID/71.31 |
| 14. Forecast of Supply and Demand of Highly
Qualified Manpower in the Federal Republic
of Germany,
L. Alex and G. Welbers. | DAS/EID/71.28
Part II |
| 20. Higher Education and Secondary Technical
Education in France as a Preparation for
Working Life,
Report by the Secretariat. | DAS/EID/71.59
Part II

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Policies and Institutions

- | | |
|---|---------------|
| 4. Means of Institutionalising the relationships
between Education and the Economy,
Italian Committee, Working Group V. | DAS/EID/71.1 |
| 12. National Policies and Highly Qualified
Manpower in Canada,
Dr. B.McFarlane | DAS/EID/71.32 |
| 15. Policies for Vocational Training and Social
Upgrading, France,
C. Blondel and J. Brumberg. | DAS/EID/71.52 |

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